VOLUME 37
NUMBER 6

CONVENTION ISSUE

JUNE, 1950

plating

RAZOR MANUFACTURE A BOSTON INDUSTRY

See Contents Page 607

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You may have one FREE
CLEPO COMPOUNDS
FOR THE
ELECTROPLATING INDUSTRY
INCLUDING THE
CLEPO MOL-EX PROCESS
CLEANING CYCLES
This Issue Contains Supplement on Plating Solution Analysis
FREDERICK GUMM
538 FOREST STREET, KEARNY, N. J.
Complete and Detailed information contained in this valuable Book will be mailed to you at once upon request from you on your company letterhead.
• WELCOME •
to the
American Electroplaters' Society
37th Annual Convention and the 4th
International Conference on Electro-
deposition.
FREDERICK GUMM Chemical Company Inc.
538 FOREST STREET, KEARNY, N. J.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 400.

1. Better than Naphtha, kerosene or chlorinated solvents for plater's cleaning
2. No harsh action on operator's hands, skin, nose or throat
3. Leaves no objectionable odor
4. Not contaminated by oil, grease or pigmented buffing compounds
5. Self-dispersing and quick rinsing
6. Speeds the cleaning cycle. Replaces alkali for phosphate treatments
7. Safe for ALL metals, including aluminum, copper, brass, etc.
8. Does not contaminate alkali cleaners
9. No heat required. Operates at room temperature, 70-90 F
10. Insures brighter, smoother, less porous electrodeposits

works like magic

ENTHONE

Emulsion Cleaner 75

removes stubborn particles of solid grease and grime INSTANTLY

Emulsion Cleaner 75 is a new development in emulsifiable solvents with the penetrating powers of aliphatic hydrocarbons, yet, dispersing in water immediately.

As a pre-soak it reaches pocketed oil, grease and persistent dirt that defy alkali cleaners.

Write today for new bulletin

Enthone, Inc.

442 Elm St., New Haven 2, Conn.

Rolling Stones THAT GATHER $

Roto-Finish Processes will reduce the finishing costs at your plant with savings as high as 80% — increase your production, and give you greater uniformity in your finishing. This fact is proven by users of Roto-Finish Processes all over the world. Cost studies show actual finishing cost reductions from 25 to 80 per cent. Roto-Finish Processes will increase your *profits* — they are "The Rolling Stones That Gather Dollars."

ECONOMY—Roto-Finish Processes reduce finishing costs.

UNIFORMITY—Roto-Finish Processes provide absolute uniformity in quantity lots.

FLEXIBILITY—Roto-Finish Processes enable the user to obtain a variety of finishes on a wide range of different parts.

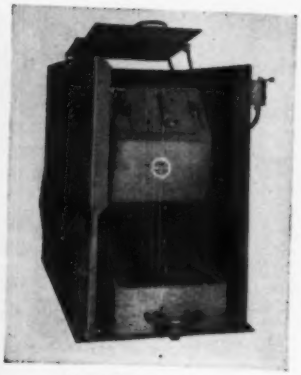
ENGINEERING SERVICE—The Roto-Finish engineering staff is constantly at your service. They direct the initial operation of Roto-Finish Processes, instruct your operating personnel, make periodic service calls, and are available to you for consultation on your Roto-Finish problems.

CHIPS AND COMPOUNDS—Roto-Finish chips and compounds are an essential part of Roto-Finish Processes.

All Roto-Finish formulas are based on Roto-Finish products to assure the maximum finishing quality and low production costs.

SAMPLE PROCESSING DEPARTMENT—Roto-Finish sample processing facilities are the most modern in the world. Located at the Roto-Finish Plant in Kalamazoo, they duplicate actual shop conditions. Here is where your sample lot of parts is processed without cost or obligation, to furnish cycle time, estimate cost of labor and materials, and determine the chips and compounds best suited for your operation.

Write for the full story of the
"Rolling Stones That Gather Dollars."



MODEL DW 22-36-1

One 22¼" x 35¼" I.D. compartment, rubber lined with QUICK-ACTION door mechanism. 1½ H.P. reversible geared head and 220-440 volt, 60 cycle, 3 phase motor with forward and reversing switch and magnetic brake. Water attachment with hose, safety guard and three point suspension swivel type hoist pan. Variable speed drive and timer controls if desired.

ROTO FINISH
Trademark Reg. U. S. Pat. Office

Make Us Prove It!

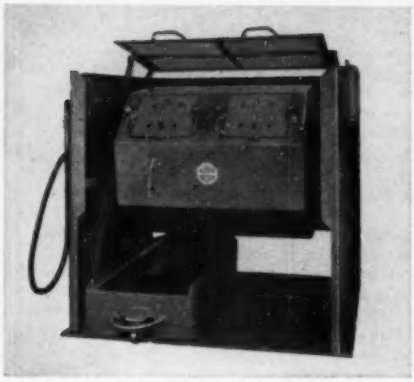
SEND US YOUR SAMPLES

The facilities of our Sample Processing Department are at your service. Send us a sample lot of your parts for finishing (include finished part for guide). Roto-Finish will process your parts—prepare a report which will then be returned to you with the finished parts—at no cost or obligation.

Roto-Finish COMPANY KALAMAZOO, MICH.

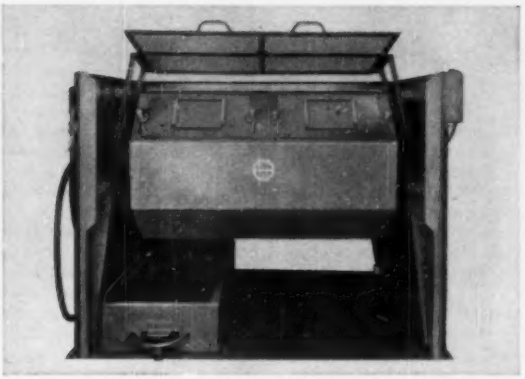
ORIGINATORS OF THE ROTO-FINISH PROCESSES

FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A 402.



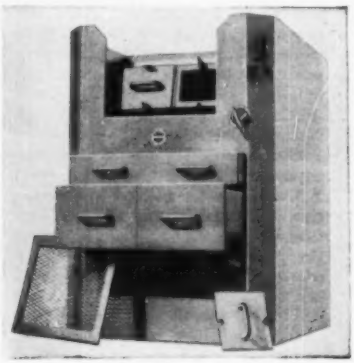
MODEL DW 45-36-2

Two 22⅛" x 35¼" I.D. compartments, rubber lined with QUICK-ACTION door mechanism. 3 H.P. reversible geared head and 220-440 volt, 60 cycle, 3 phase motor with forward and reversing switch and magnetic brake. Water attachment with hose, safety guard and three point suspension swivel hoist pan. Variable speed drive and timer controls if desired.



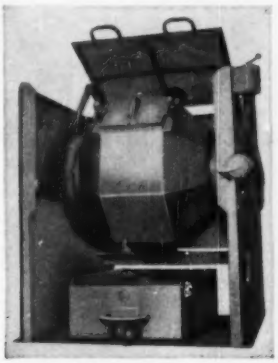
MODEL DW 60-36-2

Two 30⅛" x 35¼" I.D. compartments, rubber lined with QUICK-ACTION door mechanism. 3 H.P. reversible geared head and 220-440 volt, 60 cycle, 3 phase motor with forward and reversing switch and magnetic brake. Water attachment with hose, safety guard and three point suspension swivel type hoist pan. Variable speed drive and timer controls if desired.



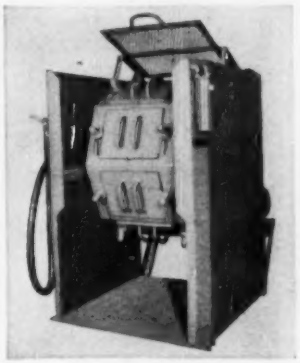
MODEL DW 16-12-2

Two compartments each, 8" x 12" I.D. and rubber lined. 1/3 H.P. varidrive motor for either 110 volt single phase or 220-440, 3 phase, 60 cycle electric power. Cylinder speed 35-70 R.P.M. Includes separating tray, chip pans and safety gate.



MODEL DW 30-36-P1*

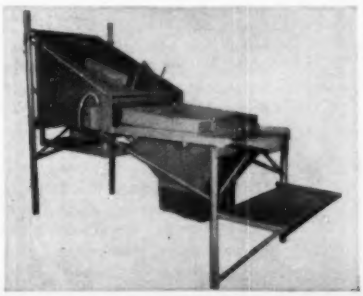
Single compartment 30" x 36" I.D. Octagonal cylinder with conical ends, 1/4" rubber lined. Equipped with cam door closures.



MODEL DW 30-36-1*

8 door fixture machine, single 30" x 36" I.D. Octagonal compartment, cam locking door closures.

*Models DW 30-36-P1 and DW 30-36-1 are powered with 3 H.P. reversible geared head, 220-440 volt, 60 cycle, 3 phase motor with magnetic brake and waterproof reverse switch. Both models have water hose attachment and safety gate. Variable speed drive and timer control are available as accessories.



MODEL M5-32-27

Mechanical Separator. A motor actuated separating machine for removing parts from chips or separating mixed chips into various sizes.

The Roto-Finish unit is strongly fabricated of welded steel. It has a variable adjustment to control the stroke which varies the rate of agitation. Can be used with the CW-45 or the CW-60 hoist pan. This mechanical separator will expedite your production.

ROTO FINISH

FOREIGN REPRESENTATIVES: England—London—Roto-Finish Ltd.—32 Bishopsgate • Holland—Den Haag—N. V. Roto-Finish Maatschappij—Voor Benelux • Switzerland—Zurich—Kay Zurich • Australia—Melbourne—A. Flavell Pty Ltd. • Canada—Windsor—Roto-Finish Canada Ltd. • Brasil—Rio de Janeiro—Commercial E Industrial de Formos Werco, Ltda. • Germany—Frankfurt a.M.—Metallgesellschaft A.G. • Italy—Milan—Societa' Roto-Finish A.R.L.

ROTO FINISH

Industry News

Annual Silverware Sales in the Nation during 1949 is estimated to have aggregated $350,000,000. The ratio of sales split about 50-50 between sterling and silverplate as to dollar volume. However, the ratio of buyers shows four purchases of silverplate to every sterling purchase.

Summer Electroplating Courses. The Joseph B. Kushner Electroplating School of Stroudsburg, Pa., announces the inauguration of three one-week summer lecture courses, to be given in Stroudsburg, Pa., heart of the Pocono Mountains, nationally known vacation paradise. The course work, while intensive, will allow ample time for students to indulge in trout fishing, golfing, tennis, boating, swimming, square dancing and other vacation activities. If desired, arrangements will be made to accommodate the families of married students at any of the many resort hotels, inns, tourist homes and boarding houses that abound in the area.

The course subjects and dates are as follows:

Week of August 6: Modern Electroplating Principles. A comprehensive survey of the theoretical principles behind modern electroplating practice. High school education or better required.

Week of August 13: Gold Plating Techniques and Problems. Special techniques and modern methods in gold plating. An intensive lecture course for those with previous experience and knowledge in gold plating.

Week of August 20: Recent Developments in Electroplating. A thorough survey of new developments and their importance; future trends. Lecture course for executives, chemists, and engineers.

The classes will be personally conducted by Joseph B. Kushner and will be limited to an enrollment of twenty. All enrollments and reservations for accommodations must be placed before July 15 and should be made by writing to Joseph B. Kushner Electroplating School, 115 Broad Street, Stroudsburg, Pa.

New General Offices for Metal & Thermit Corporation. After thirty-five years at 120 Broadway, in downtown New York, Metal & Thermit Corporation has moved its general offices to the midtown area, at 100 E. 42nd Street, New York 17, N. Y.

The Buckeye Products Company, Cincinnati, Ohio, has just completed the second expansion of its plant since the end of the war, a new building to provide additional space for both manufacturing and warehouse facilities. Considerable new equipment has been installed to increase production and give engineers improved methods for checking the uniformity of all products manufactured in the Cincinnati factory.

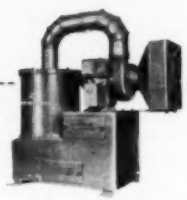
The Electric Products Company, Cleveland, Ohio has appointed **Vincent J. Brown Company** district representatives for New York State with the exception of metropolitan New York City. The Brown Company maintains offices in Buffalo and Syracuse and will be responsible for promoting the Electric Products line of synchronous and induction motors, AC and DC motors and generators, battery chargers, electrolytic power supplies and frequency changers.

Higher Supply Prices. According to Price Guide No. 505, issued by The Udylite Corporation on April 24, heavy demand had raised the market prices on copper, lead, and zinc. The prices on copper and brass anodes, as well as of copper and zinc cyanides, have risen accordingly, but zinc and lead-alloy anode prices are unchanged. Polishing-grain prices are also up.

Strong Zinc. Zinc now can be made as strong as brass, according to Dr. R. H. Harrington of the G-E Research Laboratory. He has developed a new alloy, called "zncube" (pronounced "zin-cube") composed principally of zinc, with small quantities of copper and beryllium, which has approximately the same strength and electrical characteristics as

Why it pays to SPIN-DRY plated work—small lacquered parts

Choose from 3 carefully engineered models...



1. **Standard Model.** Takes nearly every type of part. Built for long, trouble-free service.

Saves time . . . With the New Holland Kreider Dryer operating at 625 r.p.m. on only ¾ h.p. you can *spin-dry* a basket of parts (1140 cu. ins.) in as little as 35 seconds—no more than 2 minutes.

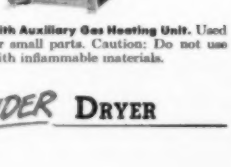
Improves quality . . . With a New Holland Kreider Dryer, high speed centrifugal spin-drying eliminates scarring and marring, assures smooth evenly dried surfaces, with longer lasting luster . . . fewer "rejects."

Cuts costs . . . What's more, though a New Holland Kreider Dryer occupies less than 6 sq. ft. of floor space, it's a big money saver. Power costs are low, production high—with little or no maintenance over years. And one man can operate it, easily, efficiently.

See for yourself. Write Department PL 60 today for illustrated 4-page folder . . . also addresses of installations near you.

New Holland Machine Co., New Holland, Pa.

2. **With Auxiliary Steam Heating Unit.** Used for small parts that hold moisture—lacquered parts—or where cold water rinse is used.



3. **With Auxiliary Gas Heating Unit.** Used for small parts. Caution: Do not use with inflammable materials.

NEW HOLLAND KREIDER DRYER

Published monthly at 5800 N. Marvine St., Philadelphia 41, Pa. Entered as second class matter July 1, 1946, at the Post Office at Philadelphia, Pa., under Act of August 24, 1916. Copyright, 1950, by the American Electroplaters' Society, Inc. Subscriptions: Domestic and Canada, $4.00 per year, 50c per copy; Foreign, $6.00 per year, 75c per copy.

How Manning, Bowman & Co. gets efficient cleaning prior to nickel and chrome plating

PENNSALT CLEANERS prove superior in rigid comparison tests

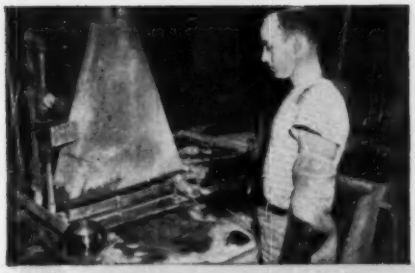
Plating on household appliances must not only be bright—for the sake of sales appeal . . . but it must also adhere tightly—to prevent it from peeling under extreme heat and humidity encountered in use. This necessitates efficient cleaning prior to plating. And that's where Pennsalt metal cleaners get a chance to show their worth.

Recently, at the Manning, Bowman & Co. plant in Meriden, Conn., rigid tests were run to determine which cleaner would permit the best plating. The general plating foreman, an expert from 'way back, was after just one thing: *results*.

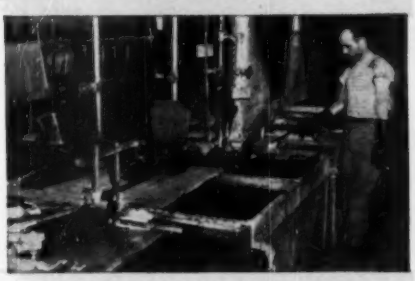
Various articles, both ferrous and non-ferrous, were sent through two parallel lines. One used Pennsalt® Z-54, the other used competitive cleaners. The tests proved Z-54 definitely superior in actual performance, and more economical per unit cleaned. Z-54 lasted much longer . . . with practically no rejects due to spotting or "color." Now Manning, Bowman is 100% sold on Pennsalt metal cleaners.

ONE BIG REASON why Pennsalt cleaners do such a consistently good job is this: as a *basic* producer, Pennsalt controls the manufacture of its products from raw material to finished form. This controlled manufacture—backed by intensive research—results in higher quality at lower cost to *you*.

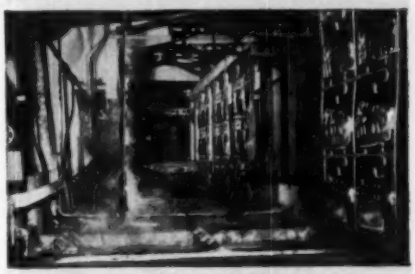
Call in your Pennsalt representative. He'll be glad to study your present cleaning method, and possibly show you savings in time and money. Or write to: Special Chemicals Department, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.



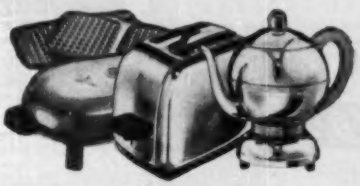
After buffing, percolator body enters first Pennsalt Z-54 bath. (Cathodic electroclean, 6 oz. of cleaner per gal., 6 volts, 20 seconds.) Hand line used for hollow-ware.



After rinse and pickle, work enters second Z-54 bath for reverse cleaning. (Anodic, 6 oz. per gal., 6 volts, 5 to 10 seconds.)



After nickel plating, work enters automatic chrome line. Tops of waffle irons are shown entering Pennsalt cleaner bath.



PENNSALT helps Manning, Bowman produce these brilliant household appliances.

PENN SALT

PROGRESSIVE CHEMISTRY FOR A CENTURY

There's a Pennsalt Cleaner for every metal cleaning operation

Results Talking!

"THE BEST CHROMIUM PLATING IS DONE WITH DIVCO 71-POINT LEAD ANODES" SAY THESE OUTSTANDING PLATERS!

UNDERWOOD CORPORATION

Sunbeam CORPORATION

TRUE TEMPER Corporation

GENUINE Amerock HARDWARE

MECHANICAL PLATING CO.

Hotpoint Inc. A GENERAL ELECTRIC AFFILIATE

Kuehne Manufacturing Co.

J. B. WISE, INCORPORATED

NATIONAL PRESSURE COOKER COMPANY

Hamilton Manufacturing COSCO Corporation

DIVCO DOES THE BEST CHROMIUM PLATING

- On *all* surfaces — Uneven! Irregular! Hard-to-Reach!
- Surfaces Considered Impossible with Other Anodes!
- Faster Plating, with a More Uniform Deposit!

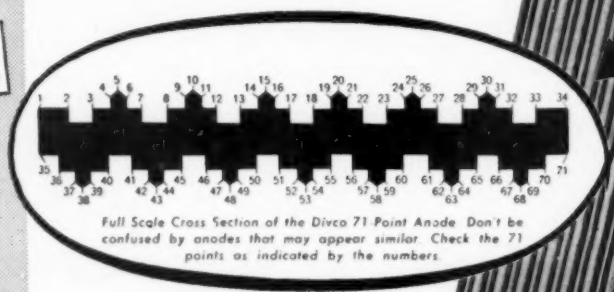
WHY?

Because DIVCO 71-Point Lead Anodes afford almost 150% MORE surface area than flat anodes — almost 75% MORE than ribbed, corrugated or sawtooth — in the SAME tank wall space! This results in lower anode current density and greatest plating efficiency!

FIND OUT FOR YOURSELF — IT COSTS YOU NOTHING!

MONEY-BACK GUARANTEE

Equip your tank with 71-Point Lead Anodes for a trial period. If Divco doesn't do more than any lead anode you've ever used, we'll return every penny you paid — and thank you for telling us about it, too!



Full Scale Cross Section of the Divco 71 Point Anode. Don't be confused by anodes that may appear similar. Check the 71 points as indicated by the numbers.

AVOID SUBSTITUTES

Look for "DIVCO" beneath the hook or count the 71 edges

Please specify bus bar size and distance from top of bus bar to bottom of anode.

FREIGHT ALLOWED — on orders of $100.00 or more — to any destination in the U. S., or to point of border crossing or embarkation on export shipments.

A GOOD NAME CARRIES WEIGHT

DIVISION Lead COMPANY

832 W. KINZIE ST., CHICAGO 22, ILL.

Other DIVCO Products:

LEAD SHEET • PIPE • WIRE • FOIL BURNING & FABRICATION

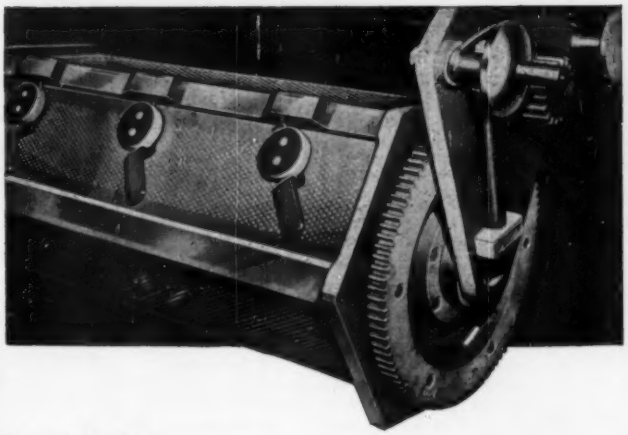
LEAD LINED TANKS • LEAD STEAM COILS

CONFORMING ANODES •

ANODES OF ALL METALS

ONE LOADING

for Complete Cleaning and Plating Cycles



in the NEW BELKE High Temperature LUCITE BARRELS

No more transferring work from barrel to barrel. You load the work once for the whole job — pickling, electro-cleaning, plating and rinsing.

Withstand All Solutions — Give long service in cadmium, nickel, copper, zinc, tin and brass plating cycles *at temperatures to 185°F.*

Molded One-Piece Construction — No panels, ribs or tie rods. No trapping of small pieces to cause rejects and unloading trouble. Faster plating and better quality.

Built for Long Service — Door opening in cylinder reinforced at top and bottom and braced across center for greater strength and to prevent warping. Hangers, gears and bearings of Melamine — No metal exposed to solution except easily replaceable ball contacts.

Other Service-Proved Features

Tight fitting covers with convenient cover locks attached.

Extra capacity, straight line current conductors.

Improved flexible dangler contacts.

Double duty bearings on drive shaft.

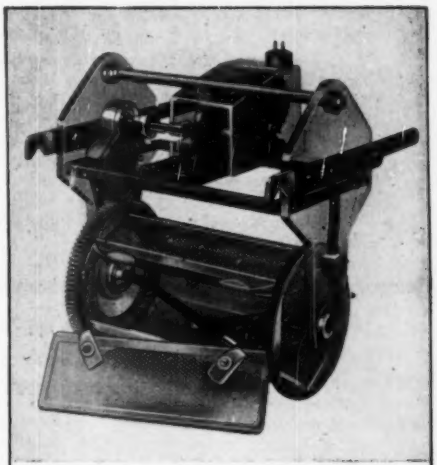
Replaceable bushings for long life with low upkeep.

To modernize your plating barrels, BELKE High Temperature Lucite Cylinders can be furnished for any size and style of hanger.

Consult your BELKE Service Engineer for complete information — or write.

Belke MFG CO
947 N. Cicero Ave.
Chicago 51, Ill.

EVERYTHING FOR PLATING PLANTS



BELKE PORTO-PLATER

For Small Odd Jobs

Sets into any still plating tank. Easily transferred by hand — weight only 27 lbs. Capacity is approximately 2 quarts. Molded High Temperature Lucite Construction withstands all cleaning and plating cycles at temperatures to 185°F.

Fast and easy loading and unloading is afforded by clutch that starts and stops cylinder without shutting off motor.

Support arms of Porto-Plater rest across bus rods so cylinder hangs down into plating solution. Uninsulated notched end of support arms contact cathode rod to complete plating circuit. Operated by complete self-contained motor drive with plug connection.

For complete information, consult your BELKE Service Engineer — or write.

NEW LUSTER-ON UTILITY-15 GIVES CHROME-LIKE BRILLIANCE FOR LESS THAN 1/5¢ PER SQ. FT.

NEW ECONOMY TO CUT YOUR COSTS!

To every manufacturer already using a passivated zinc finish, Luster-On Utility-15's amazing economy is the big news. With this remarkable new product, you can replenish with the original solution . . . dilute up to 10 times . . . use the same solution for manual or automatic operation — features never before possible with a zinc bright dip. Savings run 50% and even more!

NEW SALEABILITY FOR YOUR PRODUCTS!

If you use electro-plated zinc without passivating, Luster-On Utility-15 offers the tremendous added sales appeal of permanently bright finish at almost negligible cost — less than 1/5¢ per sq. ft. In addition, corrosion resistance is excellent, permitting free handling during assembly, packing, display and use — with no danger of finger staining or discoloration. Where chrome-like brilliance is not required, maximum corrosion protection can be secured with a single dip.

NEW RELIABILITY AND EASE OF APPLICATION!

For companies now using Cadmium or Nickel, Luster-On Utility-15 provides the great economy and speed of passivated zinc, plus sensational new simplicity and reliability of application. Composed of 95% inorganic materials, Luster-On Utility-15 is highly stable. With it, work can be handled on racks or by bulk dipping, with freedom from iridescence and exceptional uniformity. No noxious fumes . . . requires no exhaust.

Send for full details today on . . .

New Luster-on® Utility-15

In attendance at the Boston AES Convention

THE Chemical CORPORATION

54 Waltham Ave., Springfield 9, Mass.

THE CHEMICAL CORPORATION
54 Waltham Ave., Springfield, Mass.

Please send me full particulars about Luster-On Utility-15 for zinc-plated surfaces. I am (am not) sending sample for free dip. No obligation, of course.

Name .....

Firm .....

Address .....

Industry News

(*Continued from page 544*)

brass but is considerably cheaper. A foot-long strip of ordinary zinc 1/16 inch thick will droop slowly from its own weight when held horizontal at one end. With the addition of a small percentage of copper and beryllium, however, zinc takes on a springy, resilient quality.

Among applications where cheaper zn-cube might be substituted for brass, Dr. Harrington lists lamp and fuse sockets and bases, panels, containers, mild springs, and many forms of hardware. The alloy is said to machine, solder, and resistance weld easily.

American Society for Testing Materials, at its 53rd Annual Meeting in Chalfonte-Haddon Hall, Atlantic City, June 26–30, offers several papers of interest to the plating industry. Among them are papers dealing with synthetic sea water and its corrosion characteristics, spray testing with natural and synthetic sea water, and stress cracking of polythene, all of which are to be presented on Friday, June 30.

This meeting will also feature a display of testing and scientific instruments for use in production control and research.

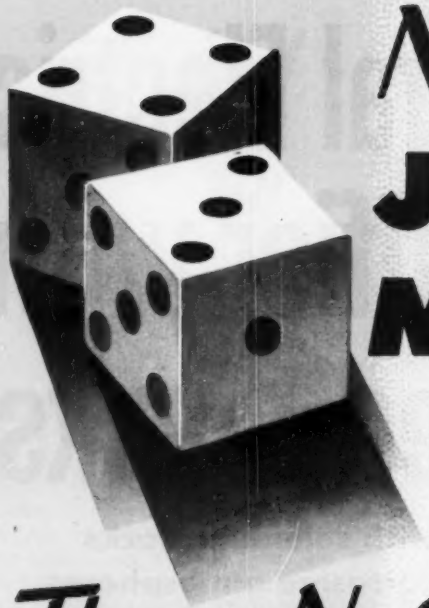
Alsop Celebrates 30th Anniversary. The Alsop Engineering Corporation, Milldale, Conn., was host to all employees and guests at a banquet on March 14 in observance of the 30th anniversary of the firm's founding.

The company was formed in 1920 as a one-man institution with walk-up quarters in a rickety building on Water Street in downtown New York. During a period of fourteen years it moved to several increasingly larger locations in New York City, but in 1936 it still found itself cramped for space and limited in manufacturing facilities and decided to "lift itself up by the boot-straps" by purchasing the present building in Milldale.

Today the company does all its own manufacturing, from raw materials to finished machines, and has extended the line of liquid processing equipment, including filters, pumps, tanks, and agitators, to the four quarters of the world. It maintains offices or distributors in every major city in the United States and also in South America and Europe. C. E. Crowley is the President.

Awards for 25-, 15-, and 10-year service were presented to two, four, and twenty-seven employees, respectively, at the banquet.

Heil Process Equipment Corporation Finishes First Twenty Years. During the Fall of 1929, this firm was founded by Carl E. Heil in very modest quarters under the name of Heil and



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JETAL FOR METAL

The BLACK FINISH for IRONS and STEELS

There's No Gambling!

You *can* be certain that:

- It's easy to use JETAL (applied without current—just by immersion bath).
- The JETAL process is fast; it's on in 5 minutes!
- You'll get more protection, greater wear resistance, consistent quality, added toughness, longer life!
- There'll be *no* chipping, peeling or cracking off even when metal is bent or cut.
- You'll *SAVE MONEY!*
- JETALIZE irons and steels in bulk, in bushels or in barrels.

But don't *stop* with the JETAL process . . . increase rust protection *after* JETAL has been applied; use JETOIL 1A, the all-around, oil emulsion after-treatment.

NO COST to have your iron or steel samples JETALIZED . . . or to have a JETAL demonstration in your own plant.

ALROSE CHEMICAL CO.

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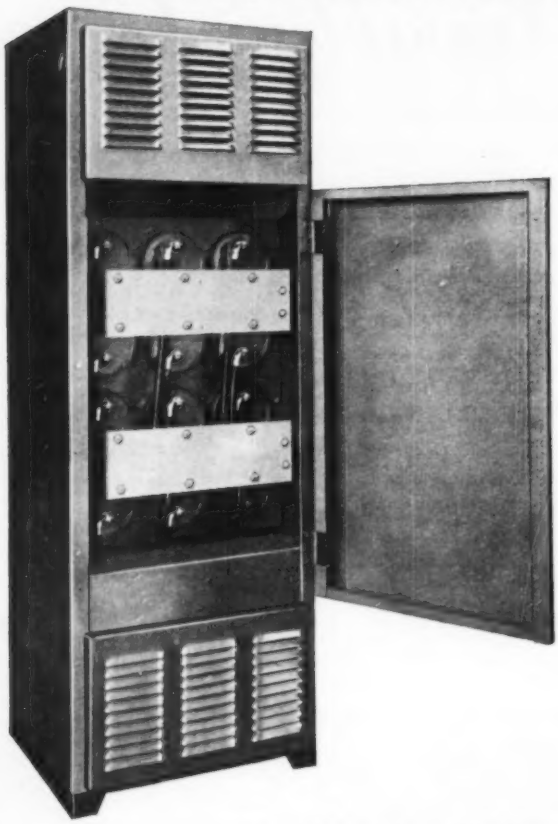
Originators of Black Oxide Finishes In The U. S. A.

NEW-General Electric Plating Rectifier with Oil-immersed Stacks

The first plating rectifier with selenium stacks completely protected from corrosive atmospheres



Here's a plating rectifier you can put right next to your plating tank without worrying about corrosion of the stacks.

Now you can have the time-saving advantage of tank-side location and cut electrical losses with short connections—yet still get full life from your rectifier stacks.

Only General Electric offers you such a rectifier. Only G.E. has an oil-immersed selenium rectifier stack designed specifically for plating work.

it's ideal for barrel plating

With a new and improved type of ventilation, and with the ample thermal capacity of the oil in the hermetically sealed can, this new plating rectifier can carry the short-time overloads without overheating. The normal cycle of barrel plating operations subjects a rectifier to wide voltage variations between no-load and full-load conditions. But this new G-E plating rectifier is designed to take these voltage fluctuations safely.

★

This new General Electric oil-immersed selenium plating rectifier is a rectifier you will be hearing about wherever plating is discussed. Get the complete details. Write to Section 464-2. Apparatus Department, General Electric Co., Schenectady 5, N. Y.

Here are some Features

Oil-immersed Selenium Stacks. Hermetically sealed in welded, oil-filled cans, the rectifier stacks are completely protected from plating-room atmosphere. No acid fumes can reach the stacks. Maintenance costs are reduced to a minimum.

Ventilation. The ventilating fan is mounted in the top of the unit—blowing air downward, directly over the rectifier units and then over the transformer. Special baffles direct air so that ventilation is not disrupted when the inspection door is opened.

Dual Output Rating. By a simple bus-bar connection, you can connect the rectifiers in series or parallel. For example, you can get 6 volts-1500 amps or 12 volts-750 amps from the same rectifier.

Dual Input Rating. This unit can be connected in delta to operate from 230 volt circuits or in wye from 460 volts. Taps are provided to correct for line-voltage variations.

Casing Design. When the inspection door is open, steel baffles protect the operator from high-voltage connections. For easy maintenance, all parts are removable from front and rear panels. To complete the corrosion resistance of this unit, all casing parts are phosphatized, then sprayed with acid-resisting hammertone gray lacquer.

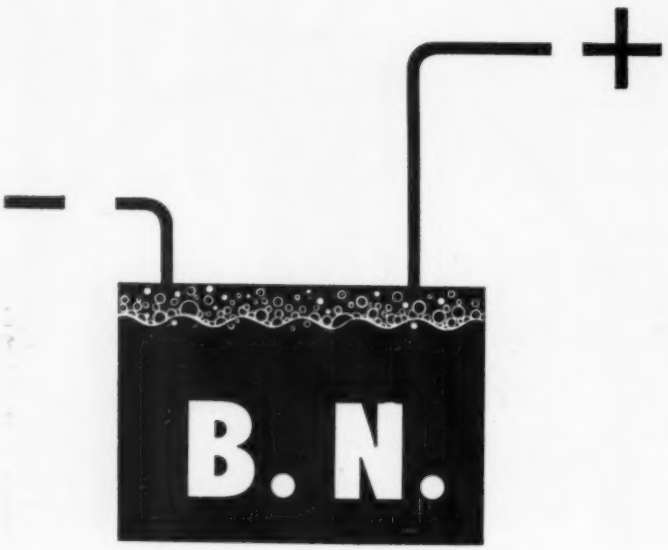
2 models—8 ratings

6/12 volts dc—1500/750 amps	230 or 460 volts ac 60 cycles—3 phase
9/18 volts dc—1500/750 amps	230 or 460 volts ac 60 cycles—3 phase

Higher ratings may be obtained by combining units in series, parallel, or both.

GENERAL ELECTRIC

464-2



. . . prepares nickel for chromium

Have you tried Wyandotte B.N.? Steadily increasing sales vouch for its performance. It's used in the preparation of nickel-plated parts for chromium plating. It does a job on bright nickel and on buffed dull or buffed semi-bright.

An excellent conductor, B.N. properly activates the nickel surface in direct electrocleaning.

B.N. wets rapidly, removes all traces of buffing compounds, lint, shop dirt and fingerprints. It has long life . . . rinses freely, eliminates clouded plate. It is dependable under a wide range of operating conditions.

For the full facts on B.N., write us.

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WYANDOTTE, MICHIGAN
SERVICE REPRESENTATIVES IN 88 CITIES

Wyandotte
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Industry News

Company, subsequently changed to Heil Engineering Company. It meant the fulfillment of an old desire to put to use ideas and products designed to combat corrosive conditions incident to handling and manufacturing of chemicals.

Since the early days, the business has been devoted to the manufacture of chemical-proof tanks and tank-heating devices. In the latter field, the well-known Heil E-type steam-jet agitators have found universal acceptance in metal pickling plants. Likewise, the firm was one of the first to design and manufacture chemically resistant heating devices from carbon and impervious graphite.

Lead and lead alloys have from the start been used in the production, and today a separate building is devoted to this work. Production in this department has included a complete line of lead-alloy anodes for electrolytic work.

Customer service, laboratory and plant facilities, have been closely coupled in the selection and application of suitable lining materials, whether they be metals, plastics, or rubbers. Such well-known products as Neoprene, Koroseal and Saran rubber are regularly used.

In 1946 the name of the business was changed to Heil Process Equipment Corporation to more appropriately identify its position in the trade.

A devastating fire struck the plant in April, 1949, and although many inconveniences were experienced, the reconstruction made for streamlining and renewing of plant facilities as well as rethinking of plans for the future.

A. S. T. M. Committee Week in Pittsburgh. *Committe B-8 on Electrodeposited Metallic Coatings* met on March 2 and 3.

A problem which had been advanced by the Industrial Fasteners Institute in regard to dimension tolerances for threaded fasteners with complementary threads when plated in accordance with A. S.T.M. Specifications for Electrodeposited Coatings of Zinc on Steel (A164), Cadmium on Steel (A165), and Nickel and Chromium on Steel (A166) was given consideration. It was decided, subject to letter ballot, to recommend amending these specifications by means of a footnote to the effect that these particular specifications do not apply to fasteners having complementary threads. The Committee is also reviewing with the Society's Committee A-5 on Corrosion of Iron and Steel the development of new specifications for fasteners.

In the Specification for Electrodeposited Coatings of Nickel and Chromium on Copper and Copper-Base Alloys (B141), it was suggested that the present Footnote *b* under Section 3 be amended to the effect that where minimum chromium thick-

THERE IS NO SUBSTITUTE FOR *Experience*

The perfection of this product is the direct result of more than 25 years of experience gained in manufacturing many millions of pounds of polishing compounds and other quality-controlled abrasive materials for the production lines of the Automotive Industry and its many suppliers in the field of Metal Finishing. We sincerely believe it to be the best product for the purpose on the market today.

C. H. McALEER, President.

WE KNOW A TEST WILL PROVE

1 INCREASED PRODUCTION—Scientific "know-how" of the blending of abrasive grains and binders and proper selection of the compound suited for the job gives you the most uniform finish and increases speed of production.

2 ECONOMY IN USE—The improved and more durable binder gives ideal adhesion to the wheel; drying time and less "off the wheel" wastage.

3 IMPROVED CONTAINER—Our aluminum-foil container is almost impervious to moisture-loss and when properly stored will remain in good condition for a year.

4 LABORATORY CONTROL—Constant laboratory control of all raw materials used and experienced supervision of manufacturing processes is maintained at all times.

SAMPLE will be sent you promptly upon request should your jobber be unable to serve you.

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NEBCO's best advertisement for its buffing and polishing wheels has always been *satisfied customers* . . . because they recognize and appreciate top quality, complete honesty and dependable performance in a product they use.

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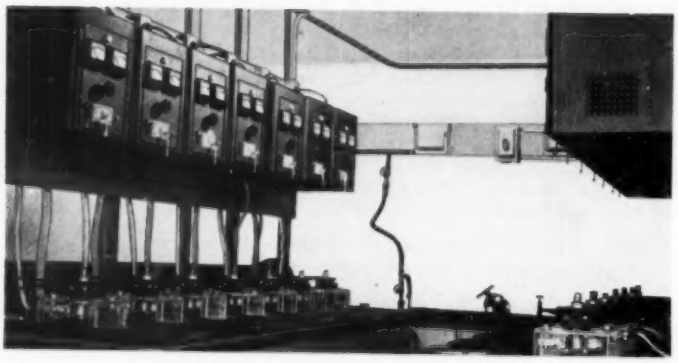

Audio Matrix did, so, they called RAPID ELECTRIC . . . Result — *50% increase in plating production.* What we did for Audio we can do for you. Our engineers will tailor-make rectifiers to meet your special problems and save you precious dollars. Call or write us today.

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Industry News

nesses cannot be obtained without exceeding the maximum of 0.00005 inch, an agreement should be reached between the producer and consumer as to the chromium thickness to be specified. It was agreed, subject to letter ballot, that Specifications A166, B142, and B200 be continued as tentative.

Subcommittee IV on Electroplating Practice has completed, or will have completed in the near future, recommended practices for plating on zinc-base diecastings, copper and copper alloys, stainless steel, aluminum, and plastics. These recommended practices will be submitted to letter ballot as soon as they are ready. The Subcommittee is also contemplating work on recommended practices for plating on tin, lead and their alloys and for plating on cast and malleable irons.

Subcommittee V on Supplementary Treatments for Metallic Coatings is developing an extensive program for testing supplementary treatments with and without organic coatings.

Considerable discussion was given to the establishment of a subcommittee on Plating Solution Analysis. A special group will consider the advisability of establishing such a subcommittee and suggest what its scope might be.

The next meeting of Committee B-8 will be at the time of the Electrochemical Society meeting in Buffalo in the Fall.

A conference on Radioactive Isotopes was held in Pittsburgh on March 2 during Committee Week to determine the interest in the establishment of a separate A. S. T. M. committee on the use of radioactive isotopes in testing. This conference was under the chairmanship of Dr. George G. Manov, Chief, Advisory Field Service Branch, Isotope Division, Atomic Energy Commission, Oak Ridge, Tenn

Dr. Manov pointed out that at the present time ther are 750 laboratories employing 4,000–6,000 trained personnel, using 10,000 shipments per year of the more than 100 different isotopes available. In addition, there are 20 consulting laboratories and 50–75 industrial users of radioactive isotopes.

In view of the broad interest in diversified fields, it was the consensus that the Board of Directors should give consideration to the organization of a new committee on radioactive isotopes.

At the meeting of *Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys*, which was held on February 27, Dr. T. P. May presented a progress report on his study of the effect of (1) natural sea water, (2) synthetic sea water, (3) 3 per cent NaCl solution, and (4) 20 per cent NaCl solution, on various metals and alloys. His report was illustrated by numerous color slides of specimens exposed in each corrosive media.

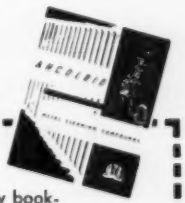
IF INDUSTRIAL METALS COULD TAKE BATHS . . .

They'd clean up with AHCOLOID 59-S CLEANER

Here's a scientifically-balanced cleaner for electrolytic cleaning of brass . . . may be used with either cathodic or anodic current. Special wetting agents assure exceptional penetrating action . . . an ordinary water rinse washes away the film in no time.

Ahcoloid 59-S Cleaner is also just right as a medium-duty cleaner for steel, as a soak cleaner for lightly-soiled brass or steel parts, as a tumbling cleaner.

Write us today about your metal cleaning requirements . . . ask for a free copy of the booklet, *Ahcoloid Metal Cleaning Compounds.*



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Announcing

UDYLITE *and* STEVENS CONSOLIDATION

65-Year-Old Company Becomes Subsidiary of The Udylite Corporation

The Udylite Corporation has acquired the entire capital stock of Frederic B. Stevens, Inc., and its wholly owned subsidiaries—the Mitchell Engineering Company of Springfield, Ohio, and Frederic B. Stevens of Canada, Ltd., a Dominion Corporation.

The merging of these two old firms—each a leader in its chosen field—will add to Udylite's famed plating products and solutions, the Stevens machinery, machine tools, equipment and compositions for plating, buffing and polishing, foundry supplies, face brick and glazed tile.

For a quarter century, The Udylite Corporation has pioneered techniques, equipment and processes for *a better way* in plating and finishing.

The Stevens background, personnel and products round out a Udylite service to the durable goods industries that ranges from conversion of raw metal in the foundry to highly polished surfaces of finished, utilitarian units.

Stevens factories and warehouses in Buffalo, New York; New Haven, Conn.; Springfield, Ohio; Windsor, Ontario, and two plants and a laboratory in Detroit—as well as the Stevens sales staffs in Cleveland, New Haven, Indianapolis, Buffalo and Windsor, will offer Udylite customers additional service points.

The scientifically trained and integrated Udylite-Stevens technical sales staff will bring to American industry a new conception of "Metal Magic."

The Udylite Corporation, Detroit 11, Michigan

New Behr-Manning belt methods

Cut contour polishing costs

Now you can polish contours with *fewer operations* and *without wheel marks*. And you can do an easier, superior buffing job after polishing — *no wild grain marks* to eat up production costs, labor and equipment time.

This new way of contour polishing has been developed by Behr-Manning application engineers, utilizing fast-finishing, cool-cutting flexible abrasive belts and special contact wheels.

See this method demonstrated in your own plant on your own work. Take this first step to gain an immediate production advantage on contour polishing operations.

BEHR-MANNING
TROY, N.Y.

Use NORTON® abrasives sharpening stones

AM-4-50

BEHR-MANNING, Troy, New York

I'd like to see a free demonstration of the new Behr-Manning contour polishing method.

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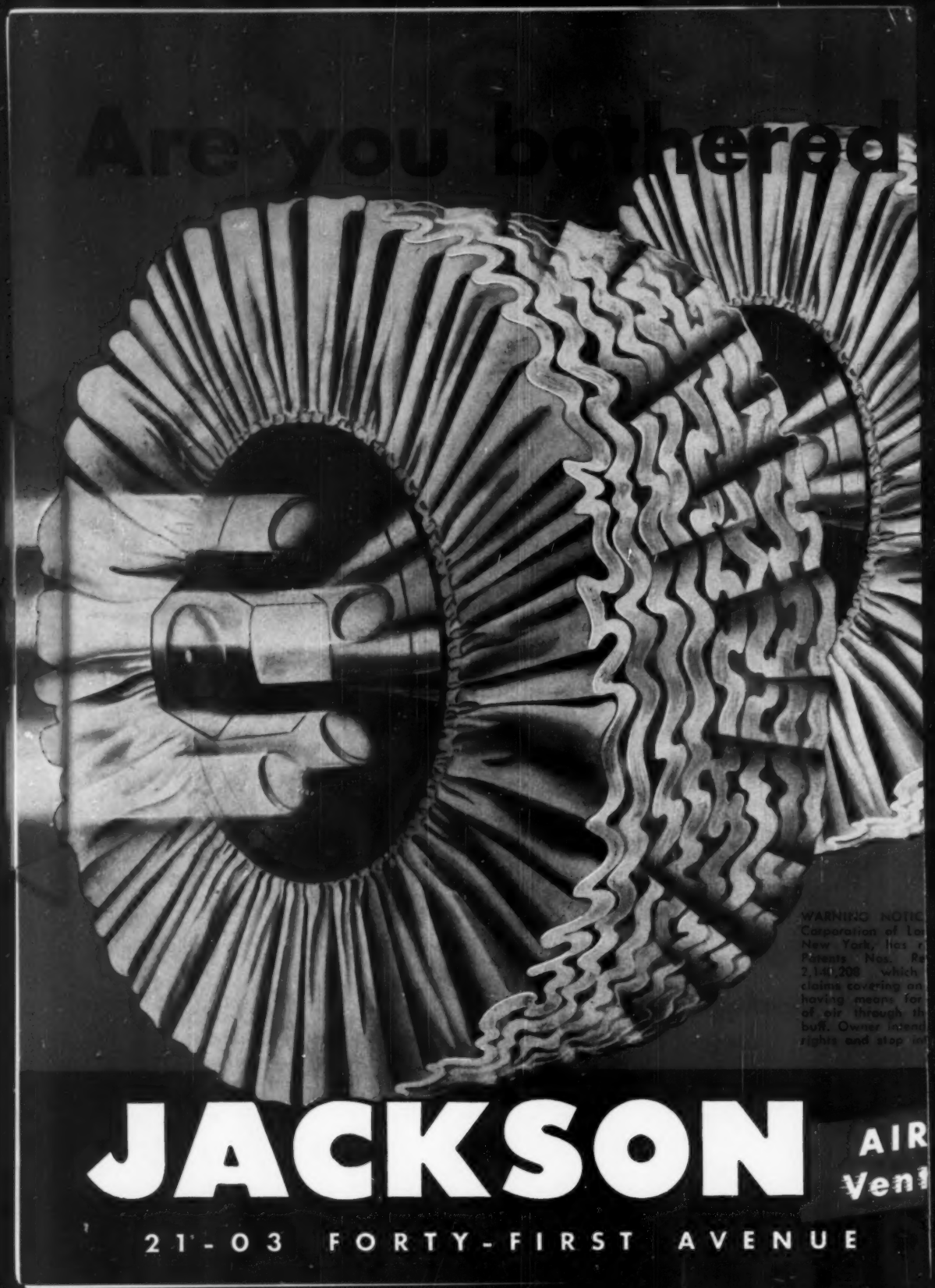
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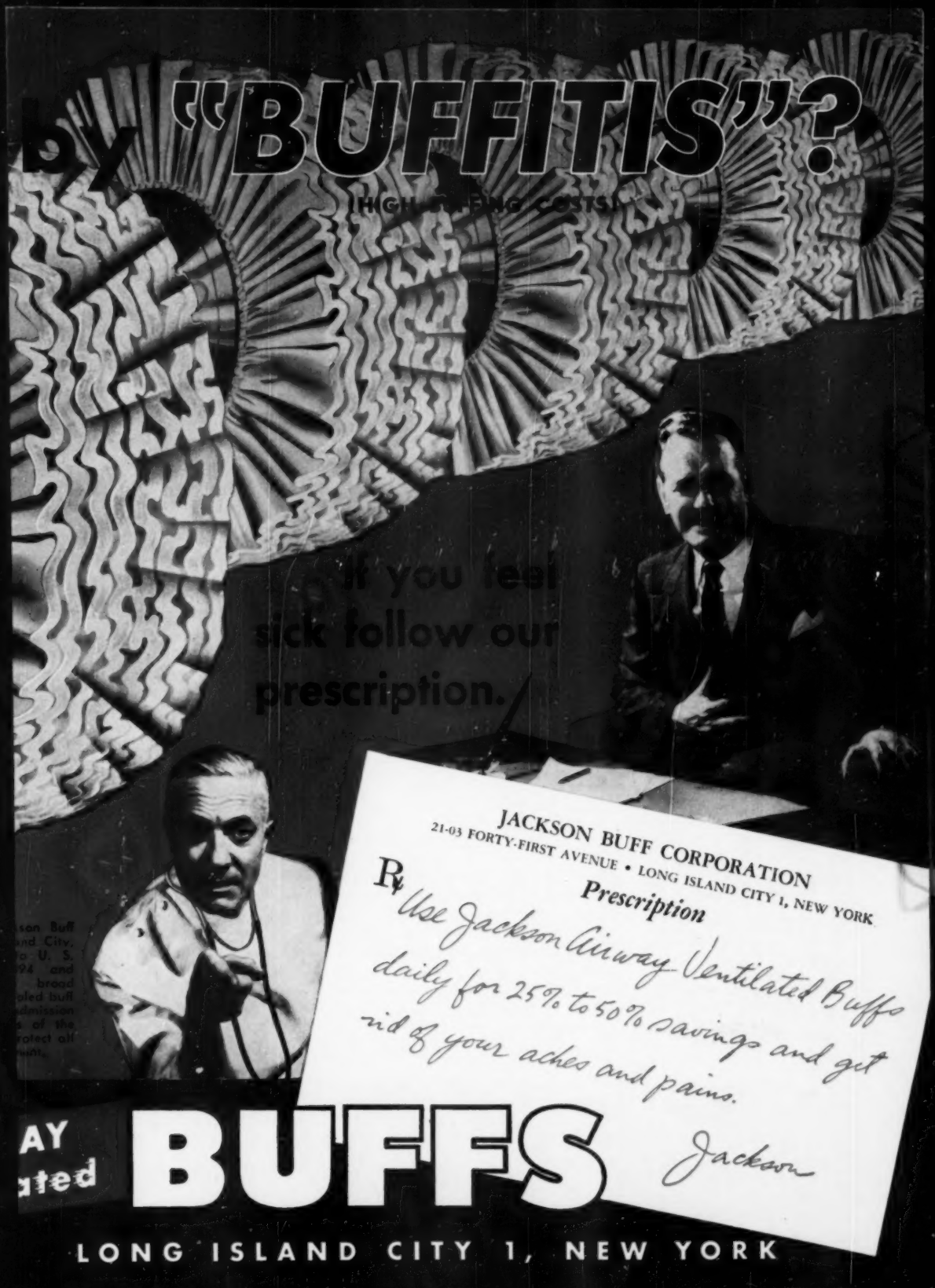
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If you feel sick follow our prescription.
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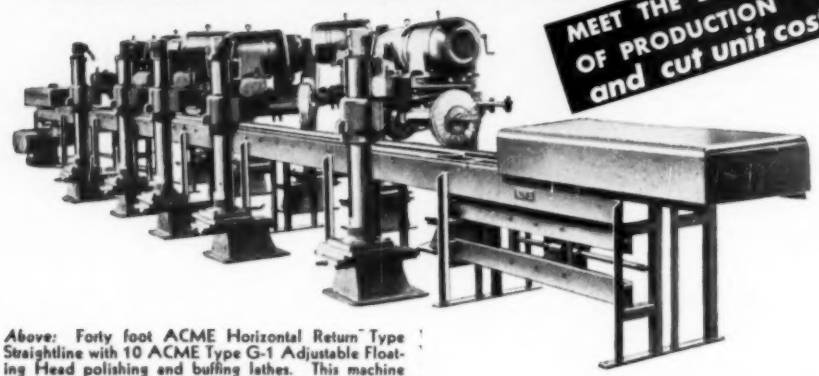
FOR HIGH PRODUCTION POLISHING and BUFFING

ACME Automatic

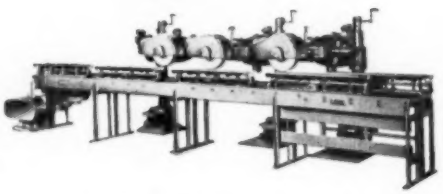
POLISHING and BUFFING MACHINES

ACME STRAIGHTLINES

MEET THE DEMANDS OF PRODUCTION and cut unit cost



Above: Forty foot ACME Horizontal Return Type Straightline with 10 ACME Type G-1 Adjustable Floating Head polishing and buffing lathes. This machine may be loaded or unloaded from either side or either end. Polishing and buffing heads may be used on either or both sides, varying in number according to the requirements of the work.



Right: Twenty foot ACME Horizontal Return Type Straightline with 3 ACME Type G-3 Adjustable Floating Head polishing and buffing lathes set on one side of the machine. This unit can be increased in length up to 80 feet by adding standard 10 foot sections to accommodate additional buffing heads.

ROTARY STRAIGHT LINE SEMI-AUTOMATIC AND SPECIAL *Polishing and Buffing Machinery*

ACME Straightlines have years of successful application to actual production requirements behind them. They are built in reciprocating, horizontal return, loose fixture and over and under types with a wide range of sizes and production characteristics. ACME Automatics, including Rotary and Semi-Automatics as well as Straightlines have a substantial background of demonstrated performance that you can rely on. These machines are backed with years of specialized experience and engineering that, through progressive development, has already met and solved hundreds of practical polishing and buffing problems.

(Catalogs on Request)

SPECIAL MACHINERY AMC AUTOMATIC BUFFING MACHINES

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Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR NEARLY HALF A CENTURY

Sel-Rex **EQUIPMENT and PRECIOUS METAL SALTS are developed by Experienced PLATING Engineers**

Now... 4 new Sel-Rex developments

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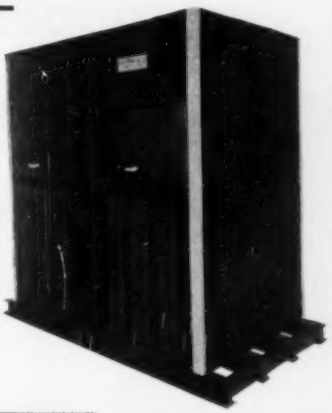
REACTRONIC SELENIUM RECTIFIERS

Fully electronically controlled

Automatic voltage and amperage without any mechanical movement of any kind. A simple turn of a small knob to any desired voltage or amperage maintains the rectifier at that point at all times.



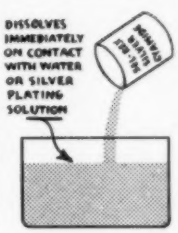
(Sel-Rex Rectifiers designed to your needs and to your specifications at any rating.)

DEVELOPMENT NO. 2

POTASSIUM SILVER CYANIDE

The only Silver Cyanide completely water soluble.

An exclusive Sel-Rex achievement in the interest of better and more economical silver plating. Eliminates the costly mixing of potassium cyanide or sodium cyanide necessary with ordinary silver cyanide. There is no waste because it does not have to first be dissolved and then filtered into the silver bath. Sel-Rex Potassium Silver Cyanide is placed directly into the silver solution.



DEVELOPMENT NO. 3

POTASSIUM GOLD CYANIDE

Purest and finest gold salts produced.

Available for immediate shipment in 41%, 46%, 50%, 67% and 67.5% (avoirdupois or Troy).

You are welcome to consult with our engineers and avail yourself of the facilities of our modern laboratory on any precious metal plating problem.

DEVELOPMENT NO. 4

DENSIMETER

All-purpose plating solution meter.

Measures current density in plating, cleaning or any type of electrolytic process. For constant check on thickness of deposit. Checks electrical characteristics of still, semi or fully automatic equipment. Indicates electrical trouble where it occurs, eliminating costly rejects. The Sel-Rex Densimeter will indicate stray currents existing in some section or specific tank that is electrically out of order.

Write for complete particulars.

Checks voltage
Checks amperage

Write for literature on the complete Sel-Rex line. Ask for your copy of "the Sel-Rex Story", an illustrative book showing how Sel-Rex Rectifiers work.

Sel-Rex *The trade mark of dependability... and your guarantee of the finest.*

See us at the Statler in Boston.

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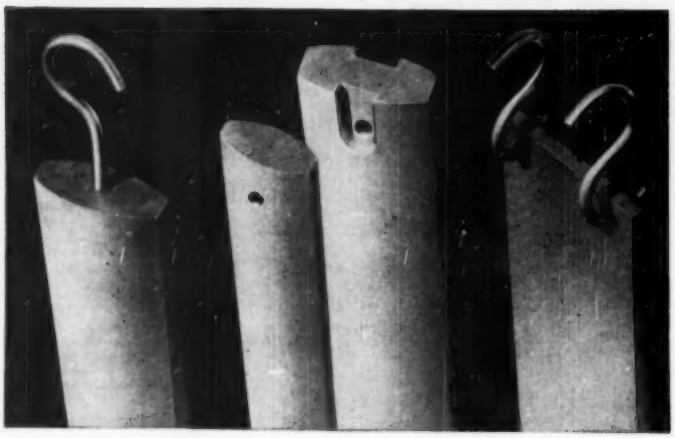
ANACONDA
means purity in copper anodes



WHEN you specify ANACONDA, you are assured of unexcelled purity . . . less than 0.01 percent of total metallic impurities . . . an advantage that pays off five ways:

1. *Copper goes into solution faster and more uniformly.*
2. *The highest quality deposit is produced in the shortest possible time.*
3. *Slime is reduced to an absolute minimum.*
4. *Spotting and discoloration of the deposit are minimized.*
5. *Scrap losses are exceptionally low.*

In addition to copper, ANACONDA Anodes are furnished in brass and bronze . . . rolled sheet or oval . . . cut to your own specifications or standard sizes . . . drilled or undrilled . . . with or without hooks—also copper "cathode-anodes". For present or future reference, write for Publication C-5, The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

50233

for Plating with Copper, Brass or Bronze

Use ANACONDA Anodes

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Industry News

Subcommittee III on Spray Test reported progress in its study of a 1 per cent glacial acetic acid salt-spray test for testing plated coatings on zinc-base diecastings. This subcommittee expects to have a definite recommendation at the next spring meeting. The present salt spray method will be continued as tentative.

Subcommittee VII on Weather is continuing its tests of the corrosivity of various atmospheres as shown by weight loss of iron and zinc specimens. There was considerable discussion on the subject of air pollution, and the subcommittee would like to work with other committees or organizations interested in this field.

Corrosion Resistance of Plastics was featured in the duPont exhibit at the recent Fourth National Plastics Exposition in Chicago.

The use of Teflon tetrafluoroethylene resin in pumps, valves, pipes, and tanks was illustrated by Teflon packing material, gaskets, and industrial finishes. Applications of Nylon included molded pipes and fittings, as well as fume vents made from heavy sheeting.

U. S. Steel Corporation, according to its annual report for 1949, installed increased capacity for the production of tin plate and two continuous galvanizing lines during the year. Among research advances are listed intensive studies of continuous galvanizing, electrolytic tin plating and related coating processes, and waste disposal and reclaimation processes.

International Trade Fair. The first U. S. International Trade Fair will be held in Chicago, Ill., August 7–19, 1950. Colonel John N. Gage, commanding officer of the U.S. Army Quartermaster Depot in Chicago, has been named Managing Director of the Fair. Present address of the Fair is Merchandise Mart, Chicago 54, Ill. Large space reservations have already been made by both foreign and domestic manufacturers.

Silver Plating Aids Jet Engine Bearings. Silver and tin are used as thin deposits on precision aircraft bearings produced by SKF Industries, Inc., for jet and piston-type engines. Plating the bronze retainers of roller bearings with silver lessens the chances of one metal "seizing" another when operating under extremes of speeds and temperatures such as encountered in jet planes. That is because the silver, 0.001 inch thick, acts as a "dry" lubricant. These retainers are in bearings that support the jet's main turbine shaft.

The races and rollers of such bearings in piston-type engines are tin plated to prevent water from rusting the highly

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4A

BUFFING AND POLISHING COMPOUNDS

You send us sample of metal used. We will return finished sample together with compound for your specific requirements.

Speed up production with correct compositions.

HARRISON & COMPANY

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Industry News

polished precision parts. The tin coating is even thinner—0.00003 inch.

The Udylite Corporation, stockholders at their Annual Meeting on Thursday, April 27,approved the proposal to acquire **Frederic B. Stevens, Inc.,** as, a wholly owned subsidiary.

An agreement was reached between the officers of the two companies last January, but formal consummation was withheld until the proposal could be voted upon by stockholders of the respective companies. Both companies are manufacturers and suppliers of equipment for the plating industry. The Stevens Company is also a manufacturer of foundry supplies and polishing and buffing compounds. The Udylite Corporation has five plants in Detroit; the Stevens Company operates plants in Detroit, Buffalo, and New Haven, Conn., and its two wholly owned subsidiaries have plants at Windsor, Ont., and Springfield, Ohio.

Frederic B. Stevens, Inc., will operate as a wholly owned subsidiary of The Udylite Corporation.

Practical Electroplating is the name of a course given one evening a week by the City College of New York at Convent Avenue and 139th Street, New York City. Prerequisites include a college course in general chemistry or extensive commercial-plating experience. The primary object of the course is to provide platers with a sound understanding of the principles underlying their work in surface preparation, electroplating and electroforming, solution control, and testing of deposits. The instructor is Julius Englesberg.

CHEMICAL ENGINEER

Desires position with opportunity for responsibility in electroplating establishment. Four years experience with zinc diecastings, solution maintenance and control.

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For Sale or Lease

Centrally located — Completely equipped — Chromium — Zinc — Cadmium — Nickel — Copper — Silver — Gold.

Emergency Sale

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CHEMCLEAN No. 999: An excellent all-around plater's cleaner. Especially good for brass and zinc-base die castings. Use as a soak; or electric, direct or reverse.

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AND—Special compounds for special cleaning problems.

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BURNISH-ALL which burnishes all metals—ferrous — non-ferrous — precious. It has a "sparkling" record!

DI-PHASE CLEANER: (Chemclean No. 133) which removes buffing compounds, hard, caked-on soils, oils, greases and drawing compounds.

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CHEMCLEAN PRODUCTS CORP.

Manufacturers of Industrial Cleaners, Strippers and Chemical Specialties

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"We can't make all the cleaners, so we make the best!"

IMPROVED

and superior by every standard of comparison . . . and costs less!

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E-1003

HEAT-CURED RACK COATING

● Now, the Michigan Chrome and Chemical Company laboratories have improved their single-dip heat-cured rack coating which offers, in addition to positive insulation and protection: (1) amazing tensile strength and scuff resistance; (2) permanent flexibility; (3) positive and continuous adhesion; (4) simplicity of application; (5) savings in time, labor, and material . . . a major objective of chemical engineers for years.

● Exhaustive tests reveal the marked superiority of Improved MICCROSOL E-1003 in every important manner of comparison. In addition to the outstanding characteristics listed above, tests for abrasion and resistance to all commonly used plating solutions, acids, and caustics show superior performance in comparison to similar products.

● Improved MICCROSOL E-1003 is a 100% solids non-evaporating material that produces a smooth, tough, leather-like coating with a single application which will often outlast the life of the rack. Racks are completely processed and ready for use in approximately 2 to 4 hours.

● Has exceptionally high gloss, allowing free drainage and no solution carry-over.

● If you are not prepared to coat your racks, write us and we will be glad to furnish the name of the applicator nearest you who is equipped to apply Improved MICCROSOL E-1003 Heat-Cured Rack Coating.

It's Improved in Every Respect!

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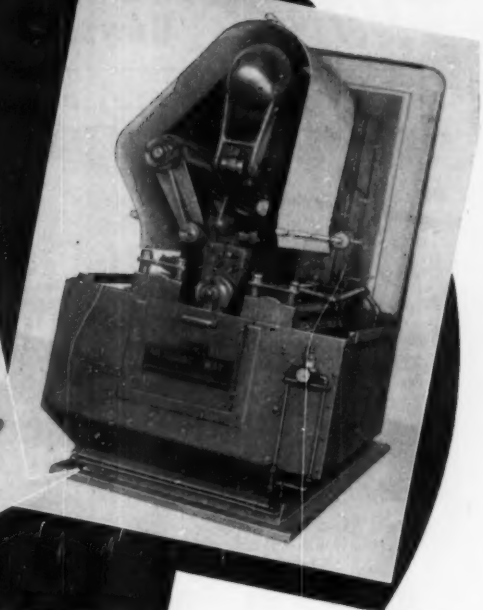
MICCRO Products

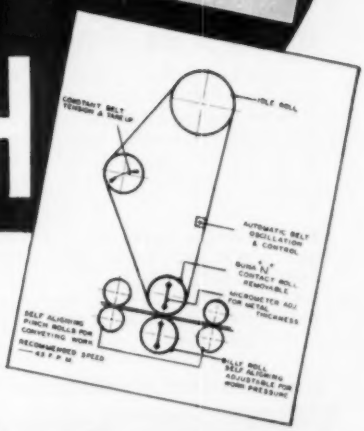
Developed and Manufactured by

MICRO-POLISH unit showing accessible controls and neat compact designs.

MICRO-POLISH unit with cabinet removed to show interior construction.



MICRO-POLISH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RECOMMENDED SPEED
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An outstanding system of sheet-grinding and polishing proved-right in actual operation.

You too, will like MICRO-POLISH because . . .

- Gives higher quality surface for any given grain size.
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- Greater operating economy.
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- It's a wet or dry process.
- Convenient, reliable controls carefully protected from abrasives and foreign matter.

We also manufacture a complete line of buffing and polishing equipment to handle any contour or formed parts. Inquiries are invited.

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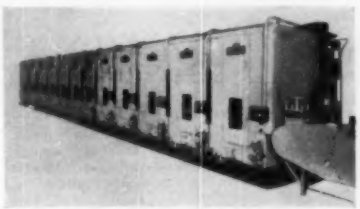

A typical 12 unit MICRO-POLISH installation.

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Eliminate Hot-Rinse Stains Unwanted Precipitates

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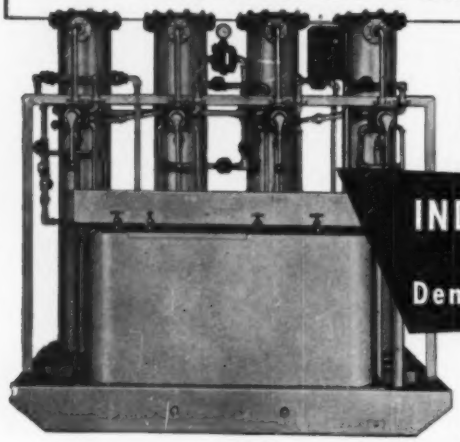

only a few cents a thousand gallons with . . . .

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A four-bed Industrial Water Demineralizer. Standard two- and four-bed units available with capacities of 200 to 1000 gph. Special units of any capacity —engineered to requirements.

and it's as simple as it looks . . .

besides the extremely low cost, there is nothing complicated about getting the chemically pure water with Industrial Demineralizers. Raw water is passed through either two or four beds of ion-exchange resins and it comes out free of the dissolved mineral salts. No still, heat, steam, or cooling water is needed—keeping space requirements relatively small.

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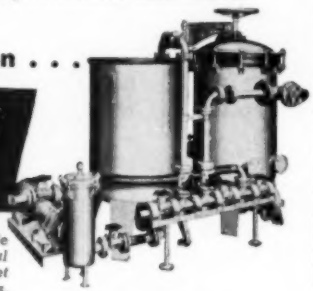
for solution clarification . . .

use an **INDUSTRIAL Filter**



100 to 15,000 gallons per hour. Portable and stationary models. Standard or special filtration systems engineered to meet unusual requirements.

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RUBBER DIVISION Vulcanized Linings • Molded Products · WATER DEMINERALIZERS

Personals

L. D. Holland, Assistant to the President and a member of the Board of Directors of E. F. Houghton & Company, Philadelphia, Pa., died on April 14 after a long illness. He was forty-six and had been connected with Houghton since 1927 as sales representative, Western Division Sales Manager, Manager of Research Sales, and Assistant General Sales Manager. Educated at Coe College, Iowa, he was married in 1926 and is survived by his widow and two daughters, also by three brothers, T. L. Holland, Cleveland, Ohio; W. L. Holland, Atlanta, Ga., and Lee Holland, Washington, Iowa.

Benedict H. Meyer, formerly Factory Superintendent of the Dexter Company, Fairfield, Iowa, now represents Zapon Powder Company's Industrial Finishes Department in Iowa, Nebraska, Kansas and Western Missouri. He will make his headquarters in Des Moines.

Robert H. Brown, Chief of Chemical Metallurgy at Aluminum Company of America Research Laboratories in New Kensington, Pa., has been chosen by the National Association of Corrosion Engineers to receive the Whitney Award for 1950 "in recognition of his outstanding contributions to the science of corrosion".

Mr. Brown was a pioneer in establishing the theory of cathodic protection, is an authority on the use of aluminum in corrosive environments, and has developed special alclad products.

He has been associated with Aluminum Research Laboratories since 1931.

Charles W. Blacketer has been appointed Technical Director of the Stamford, Conn., branch of Atlas Powder Company's Industrial Finishes Department. He came with the company last year after extensive experience with Berry Brothers, Sherwin-Williams, and Diamond Alkali Company. He attended the University of Chicago.

Mr. Blacketer is succeeded as Manager of the Customer Service Department by **Guido Ariotti,** who completed twenty-five years' service with the Zapon Industrial Finishes Department last year.

Donald Patrick, who has been with the U. S. Naval Ordnance Plant in Indianapolis, Ind., for less than two years, received a write-up in the February issue of the NOPI Gunsight. A Purdue graduate, he is best known for his work on silver aircraft bearings while with the Allison Division of General Motors Corporation. He was also connected with the Manhattan Project for four and one-half years.

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EFFICIENT at 1/4, 3/4 and 1/2 load as well as at full load. Draws only the power needed to plate the work in the tanks.

NO STAND-BY LOSSES—When no work is in the tanks, no power is wasted. The only AC you pay for is the actual DC you use.

EASY TO INSTALL, easy to operate, saving in floor space.

FOR ALL SHOPS—Sizes from 250 to 10,000 Amps. in one cabinet to operate from 220, 380, 440 and 550v lines; 3-phase, 50/70 cycles. Models available also for 25 cycles.

WRITE FOR INFORMATION or call for one of our Field Engineers to check your requirements and point out where your production costs may be reduced. No obligation whatever.

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PROMAT laboratories, which are among the finest in the electroplating field, have developed a complete line of products and controls to provide the highest quality of zinc plating and secondary treatments. They stand ready to assist you in securing superior zinc finishes. For recommendations, submit your problems or requirements together with sample parts.

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- **PRO-SEAL FINISH** — bright protective treatment for any pure zinc surface. Unequalled for brilliance and corrosion resistance.
- **C-42 ADDITION AGENT** — produces a high performance, workable and economical zinc bath with a current density range from 15 to 200 amps per sq. ft. without burning.
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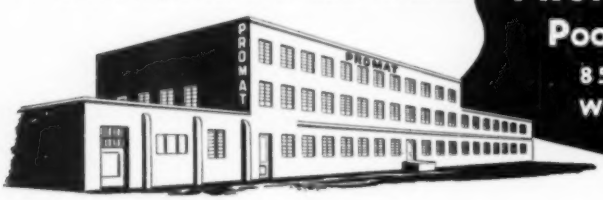
- **BRIGHTENERS FOR ZINC PLATING BATHS**
- **PROMAT "Z" BLACK FOR ZINC PLATE**
- **PROMAT PROSALT FOR THE COPPER PLATER**
- **PROMAT KICKER UNITS**

Dedicated to Research for the Improvement of Metal Finishing



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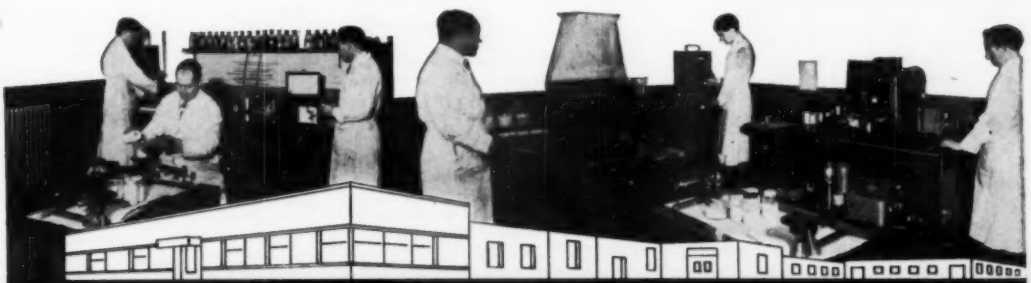
To meet today's conditions in the plating and metal finishing industry, involving changes in polishing compositions, automatic polishing, heavier and faster production and dirtier work with packed recessed areas, we offer MULTIPLE STAGE CLEANING for proper surface preparation. Whether your equipment is manual or automatic, MULTIPLE STAGE CLEANING based on our well established "Lo-Hi" pH process can be engineered to fit the job. In case you are having any cleaning or plating troubles, fill in one of our Engineering Data Sheets, which the NORTHWEST man in your territory can supply you, or write us direct. With this information, which includes your complete sequence, we will make our recommendation. . . .



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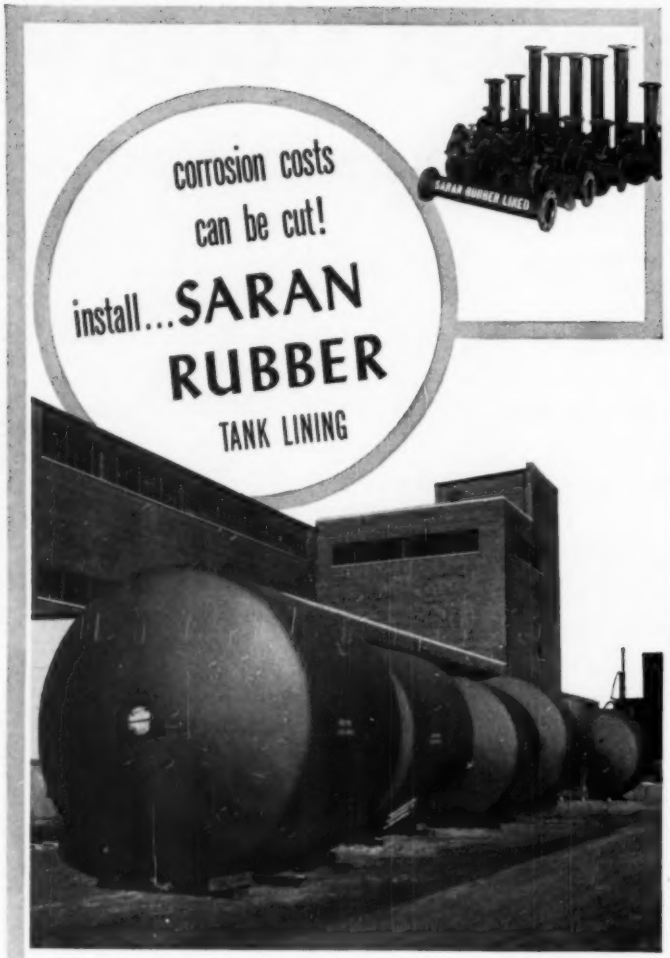
pioneers in pH cleaning control — serving you since '32



SARAN rubber combines the desirable features of rubber—flexibility and strength—with inherent ability of saran to resist corrosive liquids. Add the high degree of abrasive resistance found in saran rubber and you have an outstanding lining for the storage and conveyance of grease, solvents, acids and chemicals.

Saran rubber can be applied easily and economically by experienced tank lining applicators located strategically throughout the country. Saran rubber lined pipe is available also in 8-inch diameters and larger, and up to 20-feet in length.

Get in touch with an applicator today by contacting your nearest Saran Lined Pipe Company office or find out how you can add many years to the life of your costly equipment by writing Dept. TSP-86.

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Personals

Ford Ballantyne, Jr., a descendant of Captain John Baptiste Ford, founder of the company, has been elected to a vice-presidency of Wyandotte Chemicals Corporation. He joined Wyandotte in 1942

Ballantyne

after several years as a member of the staff of the National Bank of Detroit and has been Assistant to the President and Secretary of the corporation. He attended Williams College and graduated from the College of Business Administration of Lehigh University.

William Day, head of the patent section of the research and development division, was appointed Assistant to the President and director of the company's

Day

legal activities. A chemical engineer and attorney, he came to Wyandotte in 1944 from a partnership in the Cleveland patent law firm of Oberlin, Limbach and Day. He has had wide experience in the chemical, rubber, plastic machinery and machine tool industries.

Francis E. Gallagher, Chairman of the Board of Directors of Behr-Manning Corporation, died on March 23.

During his many years' association with the coated abrasive industry he made countless contributions important to its development. His first affiliation with this field was in 1915, when he joined the John A. Manning Paper Company of Troy, N. Y., of which he was vice-president at the time of his death. He was vice-president and general manager of Behr-Manning previous to becoming president in 1938 and served as president until retirement from active service in January, 1950, when he was named chairman of the Board. He was a member of

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COPPER Anodes . . . M-Sterling Chill-formed in flat, oval, wedge, and ball shapes. Open mold shapes also available. All of prime electrolytic copper.

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Federated Anodes are sold through offices in 22 principal cities. Quality is continuously controlled by Federated metallurgists so that the anodes are free of gates, flash, and cavities . . . of high chemical purity . . . to give uniform plating performance.

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Federated Metals Division

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A Message To Progressive Platers

EXCERPTS FROM ANNUAL REPORT ON ROHCO PROGRESS

. . . Sales of all products have increased to a noteworthy degree in the past year.

ROHCO 100 Barrel Zinc Brightener is a new product that has received enthusiastic response by customers because it combines the production of brilliant zinc plate with a very substantial savings in cost. As with all ROHCO products, many months of commercial trials preceded its being offered on the market. An important technical improvement is a modification of barrel zinc bath composition which greatly hastens covering of zinc over hard-to-plate steels and simplifies maintenance by decreased chemical attack of zinc anodes.

RINS-AID is a new product that has unusual properties in giving a water-repellent film to freshly plated work when dipped in a rinse tank containing only 10 ounces of RINS-AID per 100 gallons of water. Many advantages have become apparent in using this dip such as greater freedom from staining, brighter, more uniform deposits, and savings in labor and drying materials. Although the cost of RINS-AID is almost negligible to customers, its acceptance by the trade is so widespread that sales have greatly exceeded our expectations.

ROHCO 20XL Cadmium Brightener has proved truly remarkable in setting a new standard for cadmium plating. We know of no plant which has initiated use of this product without continuing its use, and customers have told us it should be in every cadmium bath in the country. Numerous users have reported substantial savings in expensive cadmium because of the fast covering power of 20XL, especially in recess plating. Plants not using this product cannot appreciate what it will accomplish for them in brilliance and uniformity of plate combined with ease of control and savings in cost. A further development is that 20XL is now available in either powder or liquid form, as preferred by customers.

NO-CRO-MIST the unique, soluble product for spray control of chrome baths, is now used regularly in several hundred thousands of gallons and has become accepted as an essential part of chrome plating in plants throughout the country. A new technique has been developed for using it very economically in the high strength 54 oz./gal. chromic acid baths, which has not heretofore been recommended. With the promotion of this new method of use, NO-CRO-MIST should become even more universal in its use than at present.

HULL CELL TEST SETS are used internationally for plating bath control. Probably the greatest interest in the past year in the Hull Cell is for chromium bath control for adequate adjustment of catalyst without analysis. Our special hydrometer for chrome baths, called the CHRŌMETER, is used for direct reading of chromic acid at the bath operating temperature. The most popular of our sets is the large rectifier unit with Hull Cell which has sufficient current capacity (30 amperes) for any type of small scale or laboratory plating. Both the large and small units were reduced in price a short time ago as the result of increased sales of these products.

Research on new products and improvement of present ROHCO products continues constantly and will surely result in steady progress in developments useful to the electroplating industry.

R O Hull

PRESIDENT

R. O. HULL & CO., INC., 1277 WEST 3rd STREET, CLEVELAND 13, OHIO

PRECIOUS METAL SALTS & SOLUTIONS

As specialists in the precious metals, we have both the facilities and the trained personnel best able to produce salts and solutions for the plater. As a result, ours enjoy a well earned reputation for high quality and consistent performance.

RHODIUM PLATING SOLUTION — It was in our plant that the answer to the problem of rhodium plating on a commercial scale was found. Our solution is made under the direct supervision of the men responsible for this development.

PLATINUM PLATING SOLUTION — We have developed platinum plating to a point where it stands upon a truly scientific basis. Both flash and heavy deposits are made from the same solution.

PALLADIUM PLATING SOLUTION — Produces a flash plate in from 15 to 60 seconds. Heavy deposits can be made from the same solution. Gives excellent results in plating connectors, wave-guides and other electronic equipment.

CONCENTRATED GOLD PLATING SOLUTION No. 319 — Containing one ounce of fine gold.

CONCENTRATED REPLENISHING SOLUTION No. 320 — Containing one ounce of fine gold.

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GOLD COLORING SOLUTIONS — For light, yellow, red and green gold.

HIGH GOLD CYANIDES — Our sodium-gold cyanide contains 71.5 per cent of fine gold and our potassium-gold cyanide 67 per cent as compared with commercial salts of 46 and 41 per cent. Gold content for gold content, our high gold cyanides cost you no more. We make the commercial 46 and 41 per cent salts too.

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Personals

the Board of Directors of Norton Company, a trustee of Rensselaer Polytechnic Institute, and a member of the Troy Planning Commission.

H. J. "Dick" Breithart has been appointed District Sales Manager of Wagner Brothers, Inc., 400 Midland, Detroit 3,

Breithart

Mich. He is well known to the metal finishing industries through his past activities as Sales Manager of Bruce Products Company from 1926 to 1942 and later as Western Manager of Divine Brothers. Recently, until his association with Wagner Brothers, he was Vice-President of Yerges Manufacturing Company.

L. W. Reinken, Chief Engineer of W. Green Electric Company, Inc., was recently appointed chairman of the Electroplating Rectifier Units Committee of the National Electrical Manufacturers' Association. This is the committee which, for over a year, has been developing standards for performance, test, applications, etc. of electroplating rectifiers. Ultimately standards will be published and available to all, including users.

S. W. Berman, Assistant Chief Engineer of W. Green Electric Company, Inc. was appointed chairman, for the second successive year, of the Definitions Committee of the Metallic Rectifier Section of the Association.

J. P. Murphy has been transferred from The Dow Chemical Company's Magnesium Technical Service and Development Group to the Magnesium Sales Staff of the company's Chicago, Ill., sales office.

Mr. Murphy was educated at Yale University where he received his Bachelor of Engineering degree in Metallurgy in 1942. He joined the staff of the Magnesium Laboratory in 1942, then served for two and one-half years in the U. S. Navy.

Robert L. Reeves is now General Sales Manager of the J. B. Ford Division, Wyandotte Chemicals Corporation. A native Pennsylvanian, Mr. Reeves was reared in Atlanta and graduated in 1930 from Georgia Institute of Technology in business administration. He served for four years with the Army-Navy Muni-

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A 91-foot Meaker Automatic Machine with 17 sequences.

Get Results

with a MEAKER PLATING MACHINE

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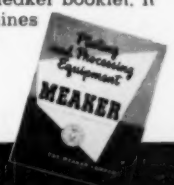
A Meaker machine makes every operation in the plating sequence automatic, or as mechanized as possible. It is the profitable way to do electroplating on a competitive basis. Large percentage savings have been the rule both in the plating departments with medium output and in the mass production plants.

Look to the handling methods in your plating work. There may be an opportunity to save a lot of money. Whatever your requirements call for—full automatic, semi-automatic, or a special machine—Meaker has the answer. Get the Meaker booklet. It shows actual installation photographs of machines that have reduced operating costs for others—these machines can do the same for you.

Ask for Booklet No. 148



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THE MEAKER COMPANY

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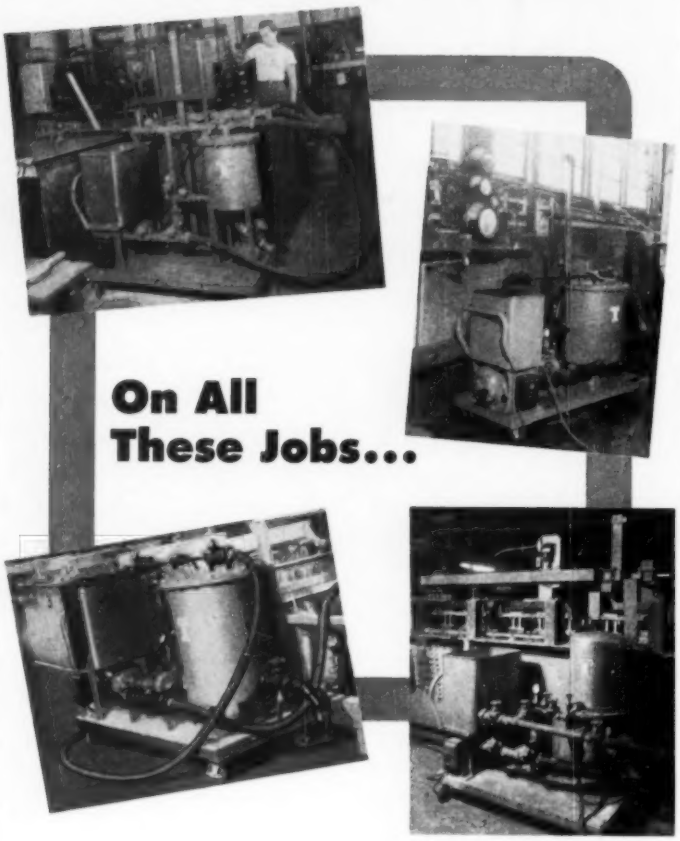
OPERATING SIMPLICITY
IS *Saving Money*



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Titeflex Filters operate entirely automatically. Precoating, filtration and cleaning all are accomplished merely by turning valves. In addition, Titeflex filters need no bags, pads or sheets. A few cents worth of filter-aid for each batch is the only requirement. Result: operation is speeded up, waste labor is eliminated, *filtration costs are lowered.* If you are seeking a highly efficient filter that will operate at lowest possible cost, find out about Titeflex.

Write For Complete Catalog

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TITEFLEX FILLS PLATING REQUIREMENTS TO A... T

Personals

tions Board, was discharged a lieutenant commander, and was cited by James Forrestal, former Secretary of the Navy. He has had fifteen years sales management experience and has recently been in charge of store merchandising for 560 units of the B. F. Goodrich Company.

Obituary

✤ **Dr. Horace W. Gillett,** sixty-six, former Director of Battelle Memorial Institute, Columbus, Ohio, died from a heart attack on March 3 in a tourist camp near Nicholasville, Ky., while returning from a hunting trip in Florida and Georgia.

Dr. Gillett was internationally known as an authority on metallurgy and was frequently referred to as the dean of American metallurgy. He was the inventor of numerous metallurgical processes and author of scores of books and articles on scientific subjects. At the time of his death, Dr. Gillett was serving as a technical consultant to Battelle, having retired as chief technical adviser of the Institute in early 1949.

Horace Wadsworth Gillett was born in Steuben County, N. Y., December 12, 1883, the son of Edward C. and Mary E. Gillett. Following graduation from Cornell University, in 1906 he taught physical and electrochemistry at Cornell while working on the requirements for his doctorate degree. During his summer vacations, he worked as a chemist with Thomas A. Edison and with Arthur D. Little, Inc. He was awarded the Ph.D. degree in 1910, and in the same year was made manager of the research department of the Aluminum Castings Company, Detroit.

In 1912, he became asociated with the U. S. Bureau of Mines and later became chief alloy chemist in charge of the field station in Ithaca, N. Y. Twelve years later, he succeeded George K. Burgess as chief of the Division of Metallurgy, U. S. Bureau of Standards. By 1929, Dr. Gillett was chosen by the board of trustees of the Battelle endowment to head the newly founded Battelle Institute. In the same year he accepted the responsibility of the editorial direction of Metals and Alloys magazine—now known as Materials and Methods.

A scientist, rather than an administrator by inclination, Dr. Gillett resigned from his directorship of Battelle in 1934 and from 1934 until 1949 acted as chief technical advisor.

He is survived by his wife Carrie, daughter Guertha M., and by two sons, Edward P. Gillett, of Bethlehem, Pa., and Horace W. Gillett, Jr., of Conshocton, Ohio.

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ACID TIN: Uniform, smooth deposits of Tin at approximately 3½ times the rate of alkaline Tin baths at same current density.

TIN FLUOBORATE: Rapid deposition of Tin from a simple, easy-to-operate bath.

COPPER FLUOBORATE: A simple, acid-copper solution depositing more copper in less time than any other type copper solution.

BRIGHT NICKEL: A superior, ductile deposit combining wide application with ease of operation.

LEAD FLUOBORATE: Dependability, simplicity, and fast uniform plating characterize this lead bath.

NIBRITE BARREL: A really BRIGHT bright nickel for barrel plating.

PERFLOW NICKEL: Unusual covering of base-metal imperfections, with resultant savings in polishing and buffing costs. Buffs very easily.

HARSHAW

Harshaw has been producing anodes and salts for electroplating for over 50 years and ranks among the leaders supplying the plating industry.

Many of the significant advances in electroplating processes and improvements in materials are a result of Harshaw research in this field. The practical experience of our field men is constantly being translated by our research laboratories into new developments for better plating.

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1945 East 97th Street, Cleveland 6, Ohio
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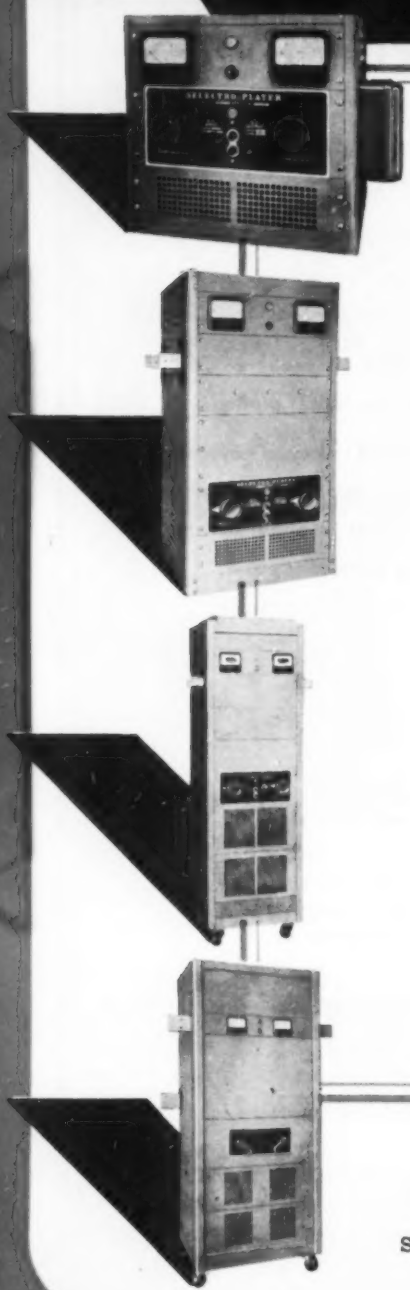
The Most Complete Line of



SELECTRO-PLATERS

The Selectro-Plater line (the original selenium rectifier for electroplating) includes over two hundred standard types ranging in capacity from 50 amperes to 5,000 amperes and in maximum voltage ratings from 6 volts to 60 volts. These units are available in three forms—basic, standard and remote control, and are used to supply D.C. power for full scale production, electroplating, anodizing, etc.

Only a few units are shown on this page. The complete line of standard units and the exclusive Green features are described in the twelve page Selectro-Plater Book—Fourth Edition—available on request from Green Electric or its representatives.

Custom-Building

Green Electric specialize in custom-building units to meet unusual requirements of layout or control, and have already engineered several thousand special jobs. A.V.S. (Automatic Voltage Stabilization) and A.C.S. (Automatic Current Stabilization) are two typical advanced developments originated by Green engineers.

FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A 437

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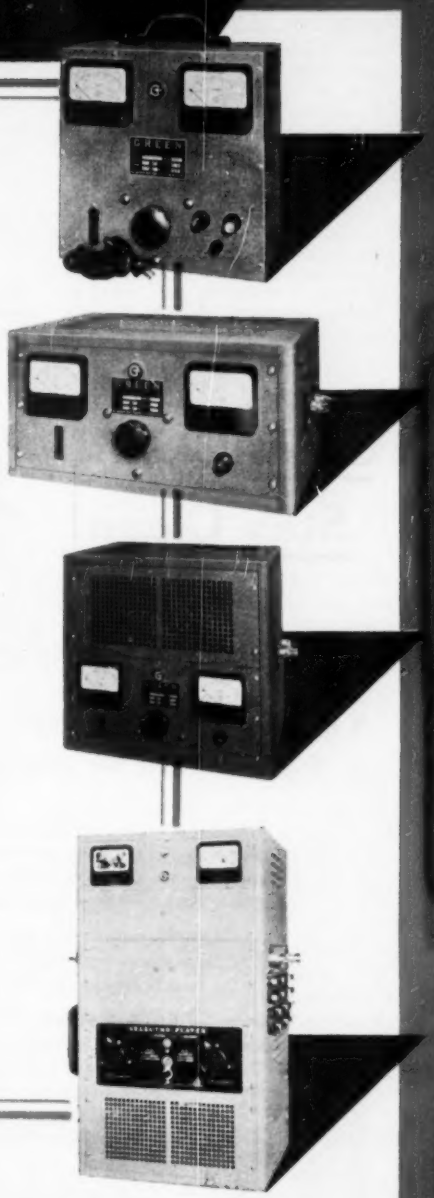
Rectifiers in the World ...



BENCH RECTIFIERS

The Bench Rectifier line offers a choice of thirty units of the portable or semi-portable type designed primarily for laboratory or small scale production work. They range in current capacity from 25 to 150 amperes and in maximum voltage ratings of from 6 to 16 volts. Special units can be had to provide higher voltages.

Standard units are equipped with cord and plug for connection to 115 volt A.C. outlet. Features include noiseless operation, natural-cooled selenium rectifier, circuit breaker switch, continuously variable voltage control, and many others. Full details are given in the Bench Rectifier booklet—Third Edition, available on request from Green Electric or its representatives.

MULTI-RECTIFIERS

The Multi-Rectifier is the de luxe laboratory power supply unit. It is three-phase operated and permits exact duplication, on a smaller scale, of the results to be expected in the plant from larger Selectro-Platers.

Four different voltage ranges are available at will from the Multi-Rectifier: 0-8, 0-16, 0-24 and 0-48 volts, thus permitting control tests or research on processes ranging from silver plating to chromic acid anodizing. Described in Third Edition, Bench Rectifier booklet. Available on request from Green Electric or its representatives.

W. GREEN ELECTRIC COMPANY, INC.

SELECTRO-PLATERS AND ALL TYPES OF RECTIFIER EQUIPMENT

GREEN EXCHANGE BUILDING, 130 CEDAR STREET, NEW YORK 6, N. Y.

Trade Literature

L—431. Phosphate Coating Chemicals—American Chemical Paint Company, Ambler, Pa., offers a 4-page Chart T.M. No. 2A, which lists twenty-five of its products and processes and opposite each gives information about metal surfaces treated, type of coating, method of application, scale of production, typical products treated, chemicals required, precleaning methods, phosphating bath conditions and type of acidulated rinse, object of coating, coating-weight range, after-treatment, ACP test set used, designation of technical service data sheet, and applicable government specifications. For your copy, use Reader Service Card.

L—432. Nickel Brightener and Platers' Ointments—A leaflet of Wambaugh Chemical Company, Goshen, Ind., describes "Nickel-Brite" brightener for nickel plating and three ointments for treating platers' infections. These are "Nickel-Itch", "Chrome" and "I-Heal-U" ointments. The last ointment has proved highly effective for cyanide burns.

L—433. Aluminum Cleaning and Processing—A 16-page booklet issued by Magnuson Products Corporation, 50 Court Street, Brooklyn 2, N. Y., is entitled "Permag for Aluminum Cleaning and Processing". It contains the latest information on Permag cleaning and processing materials and methods, including hot tank-immersion cleaning, washing-machine cleaning, solvent cleaning, steam cleaning, burnishing, frosting, stripping, cleaning before anodizing, and other operations. For your copy, use Reader Service Card.

L—434. Anti-Rust Materials and Methods—How to combat rust throughout the production process in metal-working plants is the subject of a special Service Report just published by Oakite Products, 140 Thames Street, New York 6, N. Y. It offers a concise description of specialized materials and procedures that (1) remove rust from raw stock; (2) clean and derust in one operation; (3) prevent rust while parts are being processed; and (4) prepare metal for paint while affording protection against rust before and after painting. Also reported upon are materials, for use by machine or tank methods, that remove buffing compounds, drawing and stamping compounds, cutting and grinding lubricants, mill and slushing oils, solid-particle dirts and smuts from metal parts, and at the same time provide efficient temporary protection against rust. For your copy, use Reader Service Card.

L—435. Metal Cleaning—A 24-page illustrated catalog of metal cleaning and finishing machinery is available on request (on company letterhead) to the Cincinnati Cleaning and Finishing Machinery Company, Dept. P, Schmidt Building, Cincinnati 2, Ohio. It includes a brief discussion of metal-cleaning principles plus photos and descriptions of more than a score of widely varying machine types. Many of the photos show "installed-in-operation" views, together with diagrammatic details. A number of operational features, common to machinery designed and built by this manufacturer, are shown and described.

L—436. Scale Removal—Pennsylvania Salt Manufacturing Company, Special Chemicals Department, 1000 Widener Building, Philadelphia 7, Pa., offers a folder of case histories which describes results obtained with its Pennsalt PM Compounds for descaling. For your copy, use Reader Service Card.

L—437. Liquid Waste Disposal—Whether a plant lies beside a stream or in the heart of a big city, disposal of liquid wastes is a major problem.

A new book has just been published which deals with this vital subject. It contains the Federal Water Pollution Act No. 845, several State laws, and a typical city ordinance. From these statutes management can learn what is required by law and the penalties for failure to comply with the law. In some instances the penalties are very severe. The volume also contains chapters with charts, tables and formulae written by leading chemical engineers, consultants, and others whose experience qualifies them to write on this subject. They deal with various phases

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... a clean bath for plating

Whether you are "dating" or plating, it pays to *start* clean . . . *stay* clean. You invest a lot of time, labor and money in preparing work for plating—why waste it by putting the work into a plating bath of questionable purity?

Start clean . . . *stay* clean with Red Label Darco S-51! Darco adsorbs impurities to its surfaces before they can be deposited on the freshly cleaned surface of your work.

Is your plating bath as clean as the water in your final rinse?

Red Label Darco S-51 is especially treated for use in plating—*the only carbon that will meet the benzol-mercury test!* It's easy to handle . . . easy to wet . . . easy to incorporate into a slurry. Place an order for Red Label Darco S-51 today. Practically all leading suppliers carry Darco in stock—don't accept substitutes!

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60 East 42nd Street, New York 17, N. Y.

Accepted as the STANDARD ZINC ANODE

In Case You're Not Aware of Flat•Top's Good Points...

- Distinctive shape makes confusion with cadmium or tin impossible.
- Original shape is retained right down to the nub.
- Smooth surface, free from gates and flash, prevents hanging on basket.
- Absence of pits and pockets eliminates inclusions of dirt, silicon, oxides and contamination from handling.
- Highest purity anode zinc available, processed under strict controls.
- Clean, new wooden containers, sealed against contamination. Easy to roll, truck and stack.

INDICATE A 439

It's just two years since we introduced FLAT•TOP to you. And that makes it a good time to thank you progressive plating men who have made FLAT•TOP what it is today. From Maine to California, zinc plating shops have made FLAT•TOP welcome . . . with enthusiasm. The reasons are simple: FLAT•TOP'S basic high purity, freedom from contaminating dirt, grit and injurious oxides and its ease and economy of handling. It's been winning friends so consistently that the use of ordinary zinc anodes is rapidly becoming an obsolete practice.

We believe in encouraging this ready acceptance of a good product. Now we're offering a new zinc FLAT•TOP of even *higher* purity . . . *no* contamination! We've sat up nights to *improve* our melting equipment and methods and we have established *new* controlled processing conditions which make FLAT•TOP truly *The Standard* zinc anode, by every criterion of quality.

We're shipping zinc FLAT•TOPs from coast to coast, from 250 pound kegs to carloads. Our representative in your area is ready to consult with you on your anode requirements at any time. Call him or send coupon for folders on zinc FLAT•TOP and the other Wagner anode products, copper, tin, cadmium and nickel.

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Trade Literature

of the problem and tell how some plants have already solved theirs and, in some cases, turned waste material into profitable by-products.

The book contains upwards of 80 pages, 8½ x 11 inches in size, and can be purchased from Franklyn Roberts, 3288 W. Boston Boulevard, Detroit 6, Mich.

L—438. "Material Handling—At the Machine"—This 16-page booklet, issued by Lyon-Raymond Corporation, 19662 Madison Street, Greene, N. Y., shows how proper positioning of materials saves unnecessary handling during production operations.

Two illustrative process charts are given as examples for determining the extent of handling operations from time of receipt of materials to shipment of the finished product. These charts show that positioning operations exceed those of transportation and tiering combined and consequently should receive more attention than they do in most industries. For your copy, use Reader Service Card.

L—439. Preventive Maintenance Control for Production Equipment—Preventive maintenance of machines and equipment and the record control system needed to administer such a program effectively is the subject of a release by the Systems and Methods Research Department, Remington Rand, Inc., 315 Fourth Avenue, New York 10, N. Y.

Systems described and illustrated in this 6-page folder KD-449 are being used effectively by many manufacturers to prevent interruption of production schedules, to increase operating efficiency, to prevent breakdowns in delivery promises, and to reduce cost of manufacture. The system is based on a procedure which prompts scientific inspection of machines, so as to facilitate discovery of that point in the performance of any machine where the law of diminishing returns sets in.

This folder also outlines how preventive maintenance records may be combined with property records to insure that the right amount of equipment is on hand at all times.

L—440. Electric Unit Heaters—Electromode Corporation, 45 Crouch Street, Rochester 3, N. Y., announces its new 8-page Industrial Catalog EC-62 containing descriptions, complete specifications, illustrations, and typical installations of Electromode Heaters, as well as other helpful information concerning heating by electricity. A feature is the Safety-grid heating element completely sealed into fused oxide powder encased into a seamless metal sheath and embedded in a finned aluminum casting. It is available in 11 capacities from about 5,000 to 150,000 btu. For your copy, use Reader Service Card.

L—441. Mercury Manometer Flow Meters—A new line of mercury-manometer flow meters, announced by the Fischer & Porter Company, 37 County Line Road, Hatboro, Pa., require no pressure-tight bearings or stuffing boxes.

Liquid Flow Gage

They are available in several models: close-coupled magnetic clutch, with or without pneumatic transmission to a remote location—electric impedance bridge transmitter with three times the power of previous similar devices when it is desired to transmit to a distant exhibiting instrument—automatic control of the ratio of flow rate of two fluids, and others. Furnished with 35-, 50-, 100-, 200-, and 400-inch water-column-equivalent range tubes, the meters withstand 1500 psi in cast steel construction. For your copy of Catalog 37, use Reader Service Card.

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Resists All Plating Solutions

It seems to be the opinion in many shops that application of Paste rack insulation is difficult, requiring skilled operators. That is not true. Any workman can follow simple directions and insulate racks with BUNATOL Paste insulation rapidly. Time is saved—an average rack can be insulated ready to run in two to three hours. Total cost is low compared to its long life. BUNATOL No. 1002 Paste is remarkable. So heavy and tough it stands up under rough handling and resists cuts and abrasion. Months of use show very little effect in any plating solution. High gloss surface rinses freely without drag out or carry over. Fine in Copper-Nickel-Chrome cycle. Perfect insulation for production racks. Just write and we will give all the information and show how any shop can use this improved insulation profitably.

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GOOD adhesion, flexibility and chemical resistance are combined in M&W Synpex to provide an attractive finish that can be stamped or formed without damage . . . that withstands the chemical action of cleaners and electroplating solutions as used in the production of etched name plates.

Synpex is actually a combination lacquer and synthetic enamel. It has the quick drying properties of lacquer — the building, adhesive and durable qualities of synthetics — and is unusually flexible. Available in most colors as metallic or enamel finishes, Synpex can be formulated for practically any baking schedule or may be air-dried.

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The surface of this taper forged shovel is being polished brightly with Exolon.

Polishing the shank of True Temper closed socket shovels with tough, durable Exolon aluminum oxide grain.

True Temper Solid Shank Taper Forged Shovel.

TRUE TEMPER at Dunkirk Maintains Quality Production -- *with* EXOLON ABRASIVES

EXCELLENT results have been achieved with Exolon Abrasives in finishing forged steel products at the True Temper Plant, Dunkirk, N. Y. This tough, durable aluminum oxide abrasive is recommended for polishing any tough metals such as spring steel, cold rolled stock, sheet metal, forgings and stainless steel.

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TUB CAN BE LIFTED OUT FOR DUMPING AND TUMBLING BARREL INSERTED FOR TUMBLING INSTEAD OF PLATING—VERY RIGID—THREE SPEEDS.

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"ONE MAN'S MEDICINE IS ANOTHER MAN'S POISON"

SO . . .

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No one material is a cure-all for similar jobs.

Have you a SIMILAR PROBLEM,

Where a stock material is not doing an efficient job?

The solution may be in a special material that is no more expensive than a stock mixture.

However, in most cases a standard material of our manufacture will efficiently fill your requirements.

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"We can't make all the cleaners, so we make the best!"

What Advantages does B&A Fluoboric Acid (HBF_4) (42-45%) hold for your operations?

Some Important Uses For Fluoboric Acid

Electropolishing of Aluminum—to produce mirror-like surfaces such as those on light reflectors.

Metal Finishing—as a matte pickle for zinc; satin dip for brasses and bronzes; plating bath control where fluoborate solutions are used.

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Established 1909
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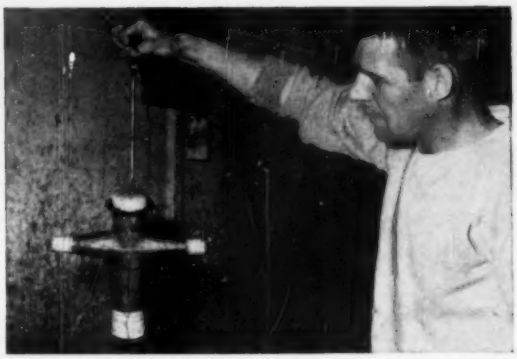

LANDING GEAR STRUT masked with "SCOTCH" Pressure-Sensitive Tape No. 470 for cold cadmium plating. Plastic-backed tape is fast, easy to apply, gives cheaper, better protection—even against hard-chrome plating. Strong adhesive allows no solution "creep-under." Whatever *your* plating problem, "SCOTCH" Brand Pressure-Sensitive Tape is ready to save you time and money. Write Dept. P-650 for complete information. No obligation, of course.

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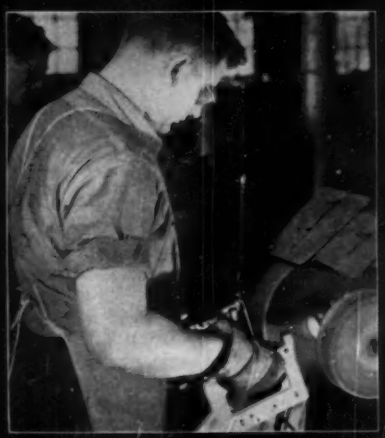

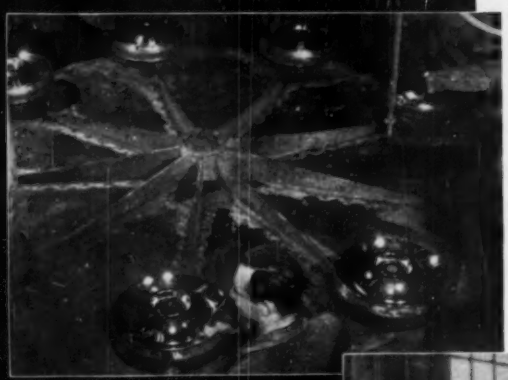

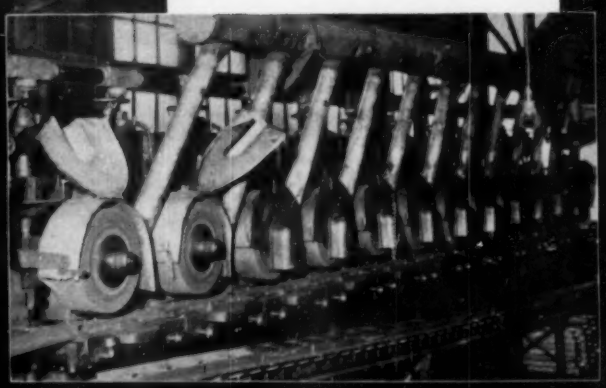

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- For a general purpose abrasive for roughing or finishing—where long life is of primary importance—and where the wheel is set up with cement or glue—specify B-treated ALUNDUM Abrasive
- For finishing operations, where glue is the adhesive, specify R-treated ALUNDUM Abrasive

If you are barrel-finishing metal parts, ALUNDUM Tumbling Abrasive can save you money.

- It's all abrasive for a continuous cutting action
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G-220

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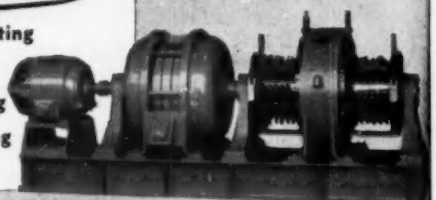
Electropolishing

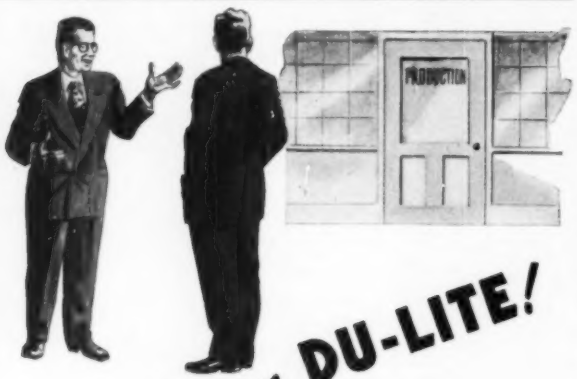
There's a Columbia M-G Set available for your needs, whether you have a small plating bath or a large continuous strip plating line. Capacities up to 20,000 Amperes; 6 Volts and up. Dependable, performance proved, for many years. Your inquiries solicited.



COLUMBIA ELECTRIC MFG. CO.
4533 HAMILTON AVE. CLEVELAND 14, OHIO

Write for Catalog PL-700

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 455.



"I'm sold on DU-LITE!

. . . *and here's why.* When you are running a large volume of steel parts in your black oxidizing bath, you cannot afford to have any stoppages or slow-downs because of inefficient operation. After installing DU-LITE, our black finishing trouble was over. Now the process is fast and sure and, what is more, the process is inexpensive to install and simple to operate. The Du-Lite Chemical Corporation also has factory trained engineers to get you started and find the workable answers to every finishing problem that arises."

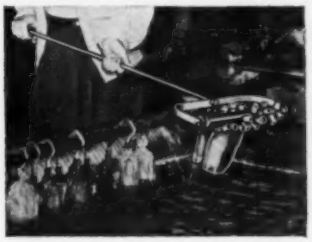
While matching or excelling, in every respect, any other process for the chemical blacking of steel, except stainless, DU-LITE remains less costly to operate than most, so why not DO IT RIGHT WITH DU-LITE. *Write, or phone today.*

THE DU-LITE CHEMICAL CORPORATION

140 RIVER ROAD • MIDDLETOWN • CONN.

Equipment and Supplies

E—480. Tank Magnet—Eriez Manufacturing Company, Erie, Pa., is offering a low-cost permanent-magnet device for removing ferrous parts from electroplating tanks, alkali baths, acid baths, etc.



Made of stainless steel, the tank magnet is said to be temperature-acid and alkali-proof. It is operated very much like a carpet sweeper, with the magnetic tube mounted between neoprene wheels. Ferrous material moves to the magnet and spreads itself over the entire circumference to a thickness of about ¾ inch. Unloading is accomplished at either end by simply pushing the upper ring from one end of the tube to the other, where a nonmagnetic section causes the load to be released. It is available in 48-inch overall length, 16¼- and 21⅛-inch widths. For further information, use Reader Service Card.

E—481. Gold Alloy Plating Process—A process which makes possible the electrodeposition of long-wearing hard gold alloys of various popular shades, called the Auralloy Process, is announced by Platers Research Corporation, 59 E. 4th Street, New York 3, N. Y.

For flash deposits, the process may be used without a pre-plate to obtain the various Hamilton, Pink and Green colors. Deposits are said to wear much longer for comparable gold content than those obtained by any other known process. Auralloy is especially recommended for heavy deposits, claimed to be unusually hard, ductile, adherent to the basis metal, and easily polished and to compare favorably with products made from rolled-gold stock. For further information, use Reader Service Card.

E—482. Plating and Polishing Shop "Widgets"—The word "widget" is not in the dictionary. It was coined to cover the endless variety of little, seemingly insignificant items that save time, eliminate trouble and bother, and cut costs; in other words the thousand-and-one-everyday indispensables used in plating and polishing. They are almost unnoticed—until they are not there when needed.

WILLIAMSVILLE *Buffs*

Tailored-To-Task Cutmaster Buffs

Run Cool – Won't Ravel

Cut Overhead Costs

Consult us now about your needs!

WILLIAMSVILLE BUFF DIVISION

The Bullard Clark Company

DANIELSON, CONNECTICUT

News about UNICHROME Trade Mark COATINGS for METALS

CHROMIUM NOW PLATED 20% to 80% FASTER!

Here are actual results obtained by users of the New Unichrome S.R.H.S.* CHROMIUM SOLUTION

(self regulating high speed)

1. AUTOMOTIVE SUPPLIER was able to meet chromium thickness specifications and still cut plating time to 100 seconds, because the S.R.H.S. bath plated 40% faster. Formerly they had to load generator, but S.R.H.S. Chromium enabled them to use lower amperage. Result: Fewer rejects, lower operating costs.

2. WELL KNOWN ELECTRICAL COMPANY found that S.R.H.S. Chromium deposited .0029" an hour. This was 55% faster than in the conventional solution. The deposits had better color, and less treeing and nodules.

3. LARGE CONTRACT PLATING PLANT plates rings in 35 minutes. Formerly took 65 minutes in standard chromium bath. And whereas the standard solution gave .002" build-up on edges, this problem is practically non-existent with the S.R.H.S. bath.

As you can see, speed isn't all. S.R.H.S. Chromium also provides more uniform quality, and a consequent reduction in rejects. It has higher cathode efficiencies, and plates brighter over a wider current range, with less likelihood of burning and "missing." A self regulating solution, it seldom varies from optimum plating balance.

Developed by "Coatings for Metals" headquarters, the Unichrome S.R.H.S. bath can help *you* do more profitable chromium plating also. For more details, write for this bulletin.

UNICHROME Trade Mark

UNITED CHROMIUM, INCORPORATED

100 East 42nd St., New York 17, N. Y.
Detroit 20, Mich. • Waterbury 90, Conn. • Chicago 4, Ill.
Los Angeles 13, Cal.
In Canada: United Chromium Limited, Toronto, Ont.

Why use two prime coats on racks?

Unichrome primer 219PX is a *single* prime coat system for plastisol rack coatings that *works*. Used with the highly chemical-resistant Unichrome Coating 218X, it assures lower application costs and rack protection that adheres through every plating cycle, including vapor degreasers!

For a zinc finish that stays bright

Because it gives zinc plate a brilliant lustre, protects it from corrosion, and costs so little, Unichrome Dip Finish is being used extensively on refrigerator shelves today.

Less buffing for copper plate

Without using brighteners, Unichrome Pyrophosphate Copper deposits a s-m-o-o-t-h plate. If needed at all, buffing of this ductile copper takes less time and effort.

Beating corrosion in plating plants

Tanks, ducts, metal work, walls, concrete floors—when protected with Ucilon Coating Systems—withstand acids, alkalies, water, cleaners, as well as fumes and splashing from all plating baths.

If you want results like this...

use

DIVERSEY No. 909

Unique Heavy Duty Soak Tank Cleaner

WITH

DIVERSEY No. 12

Reverse Current Electrocleaner

Tubular Steel Furniture—Case History

PROBLEM: To clean polished steel tubular furniture prior to bright nickel and chromium electroplating.

FORMER PROCESS: Included mineral spirits soak, handwipe, spray wash, alkaline soak and two electrocleaning operations. Six men, working steadily, were required.

PRESENT PROCESS: Includes Diversey No. 909 soak, Diversey No. 14 spray wash, and Diversey No. 12 reverse current electroclean.

RESULTS: The Diversey Process completely removes oil and grease from the inside of the tubes avoiding contamination of pickle and nickel tanks as characterized the previous process. The cleaner tanks now are dumped every two weeks rather than every week as was formerly necessary. The No. 909 and No. 12 are the only materials this leading finishing plant has found that would eliminate the solvent and handwipe operations. The elimination of handwiping labor costs results in an estimated savings of $15,000.00 per year. A definite improvement in smoothness and luster of the electrodeposit resulted with Diversey No. 909.

MAIL THIS COUPON FOR COMPLETE INFORMATION

THE DIVERSEY CORPORATION
Metal Industries Department
1820 Roscoe Street • Chicago 13, Illinois
In Canada: **The Diversey Corporation (Canada) Limited**
100 Adelaide Street West, Toronto, Ontario

THE DIVERSEY CORPORATION
Metal Industries Department
1820 Roscoe Street, Chicago 13, Illinois

Gentlemen:
Please send me complete information on Diversey No. 909 and No. 12, including New Bulletins.

Name_____ Title_____

Company_____

Address_____

City_____ State_____

DM-2

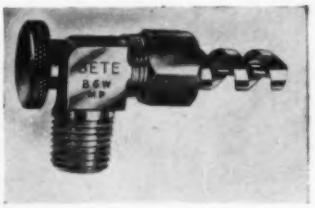
Equipment and Supplies

Hanson-Van Winkle-Munning Company, Matawan, N. J., now offers a full line of "widgets", formerly available only from a dozen sources, including air-agitation piping; Ano-Caps to reduce anode scrap loss; carboy pouring spout with safety air vent; carboy tilters of steel, safety type; Klinch grain cement and thinner; platers' clocks; earthenware crocks and dipping baskets; emery troughs; electric glue heaters; Kote Masq stop-off lacquer; Kote-Rax liquid rack covering; leather for polishing; platers' microscope; Platin-Nig for oxidizing silver; Kube-Cut hardwood sawdust for drying; wooden-soled shoes; solution skimmers; syphon breakers.

E—483. Portable Electric Instruments—A new line of portable instruments, designated type P-12, is available from the Westinghouse Electric Corporation, P. O. Box 2099, Pittsburgh 30, Pa. Rated in the 2 per cent accuracy class, the line utilizes both moving-iron and permanent-magnet moving-coil mechanisms in a compact molded case. The complete line is magnetically shielded to permit use of the instruments on both magnetic and nonmagnetic surfaces and spaced as closely together as is required.

The line includes single and multiple range models. Ammeters are available in full-scale ranges from 20 microamperes to 50 amperes DC, voltmeters from 10 millivolts to 800 volts DC. The outline dimensions of the meter are: 3-5/16 inches wide, 4¼ inches long, and 1-25/32 inches deep for the DC type. For further information, use Reader Service Card.

E—484. Nozzle for Wide Angle Spray—Unusually wide angle sprays can now be obtained by means of a spiral nozzle, newly designed by the Bete Fog Nozzle Company, Greenfield, Mass., using a unique patented spiral principle, first put on the market last year.



Designed for low flow rates and requiring extremely low pressures, it is said to produce uniformly small drop sizes with a 180-degree umbrella spray pattern of wide coverage.

Due to its spiral design, it is relatively nonclogging and can be easily cleaned on the job by means of a removable pin, interchangeable to provide different flow rates in the two sizes, for ½–2 gpm and for 1½–4 gpm. For further information, use Reader Service Card.

E—485. Alkali and Acid Resistant Cement or Coating—The Electro Chemical Supply & Engineering Company, 750 Broad Street, Emmaus, Pa., announces a thermo-setting resin, Duron, which is said to adhere without the use of a primer to concrete or metal and to be self-hardening at room temperature. The adhesive properties are claimed due to the fact that, unlike other thermo-setting cements and coatings, Duron is not derived from phenolic or furfuryl alcohol resins.

Inert to solvents, greases, alkalis of all concentrations, and a wide range of acids, the material is used in the manufacture of cement for joining brick and tile; as a coating for concrete, steel or wood; and as an impregnant for wood. For further information, use Reader Service Card.

E—486. Light Weight Monorail System—Whiting Corporation, Harvey, Ill., offers a new "T-beam" Trambeam monorail materials-handling system specially designed for economical overhead handling of light loads on short spans. Interconnectable with the conventional Trambeam, it consists of a one-piece rail section, made of high-carbon steel to provide extra strength without extra weight. The rail has a flat tread said to be of

in BURNISHING MATERIALS
the BALL rolls 'em SMOOTH
For smooth, even burnishing of flat and gently curved surfaces . . . use Abbott "Eclipse" or "Abco" Burnishing Balls. They're sure to do the job right!
Abbott Burnishing Materials, available in five shapes — Ball, Ovalball, Cone, Diagonal, Pin — are scientifically designed to make effective contact on metal stampings or castings of any size and shape. Each piece is a burnishing tool made from Abbott's high quality bearing ball steel. Each is deep hardened and polished to a mirrorlike, glasshard finish. For better all round burnishing . . use Abbott!
Some parts require a special mixture of Abbott Burnishing Materials. Send for catalog — No obligation.
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ABBOTT
the all round ball

MIRACLE-BAR... 4C's YOUR FUTURE

THE PROVEN MILLER BUFFING COMPOUND

CUT

Miracle Bar has a fast and efficient cut. The exceptional cut provided by this Tripoli definitely prolongs buff life, provides powerful savings in wheel costs and processing time. Miracle Bar is made from pure SENECA STANDARD TRIPOLI for which there is no substitute IF IT'S OPTIMUM CUT YOU WANT IT'S MIRACLE BAR YOU WANT!

COLOR

Miracle Bar produces brilliant lustrous color on all metals. Looking for a high color jewelry finish, in jig time, on your work? IF IT'S MIRROR FINISH AND COLOR YOU WANT IT'S MIRACLE BAR YOU WANT!

CLEANING

For immaculate cleaning qualities Miracle Bar has no peer. This Tripoli cleans immediately, regardless of when the part has been buffed; today, last week, or a month ago. Any soil is not only removable, but the work remains lustrous ready for your plating cycle. Miracle Bar is primarily made for Soak Cleaners, but is readily adaptable to any type cleaning. IF IT'S CLEANING MAGIC YOU WANT IT'S MIRACLE BAR YOU WANT!

CONTROL

Efficiency personified, characterizes the production of Miracle Bar. Batch to batch control assures the customer receiving, on each and every order, the same high quality, high efficiency materials — the unusually fine constant performance of Miracle Bar. IF IT'S HIGHLY EFFICIENT, ECONOMICAL COMPOUND YOU WANT, IT'S MIRACLE BAR YOU WANT!

Meet the Miller Miracle Bar . . . it's extruded. Miracle Bar is only new in the sense that our improved and greatly expanded extruding facilities now allow us to offer this compound to the entire finishing industry. This is the same compound successfully used by some of the largest metal finishers in the country for the past two years.

The success of Miller's Miracle Bar has been phenomenal and it is with a feeling of satisfaction we are now able to offer this Tripoli to every metal finisher.

IT'S A PROVEN PRODUCT

Miracle Bar is a completely proven product. It gives you maximum cut, brilliant color and cleaning qualities never before offered in any buffing compound.

A typical simple cleaning cycle of emulsion soak — spray washer—electro clean — water rinse, removes Miracle Bar instantly, keeps you entirely free from all plating trouble due to inefficiently cleaned parts.

Investigate Miracle Bar Tripoli today — it means a *bright* future for you.

See Our Demonstration at the Boston Convention

SEND FOR YOUR *GUARANTEED* TRIAL ORDER NOW

To increase your finishing efficiency and reduce your costs, send your purchase order for a 200 pound barrel of Miracle Bar Tripoli today. Use it — if you aren't completely satisfied there will be no charge. This is no gamble. We don't ask you to assist in developing a new compound. Miracle Bar is a thoroughly proven product. Place your order today — we'll ship your Miracle Bar to you immediately, freight prepaid destination.

J. C. MILLER COMPANY
631 Chestnut St., Grand Rapids, Michigan

Equipment and Supplies

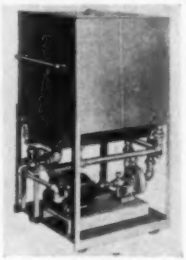
exceptional wearing quality. The rail and its hangers are flexibly suspended to eliminate torsion on the hanger rods and to equalize wheel loads. The system will be engineered, fabricated, and erected for each individual job by experienced distributors in all parts of the country. For further information, use Reader Service Card.

E—487. Pre-Tested Activated Carbon—The Hanson-Van Winkle Munning Company, Matawan, N. J., now offers, at competitive price, a new activated carbon called Pur-O-Carb, selected as the best available for purifying bright-nickel solutions of all types and all other acid or alkaline plating solutions. Every production batch is tested for effectiveness. Upon approval, a label is placed on each container which goes into warehouses or direct to the consumer. For further information, use Reader Service Card.

E—488. Corrosion Resistant Coating—End-O-Rust, a corrosion- and oxidation-resistant coating made by End-O-Rust, Inc., 1900 Euclid Avenue, Cleveland, Ohio, was developed primarily for use on metals but is said to seal successfully concrete, wood, and fibre as well. Laboratory tests are said to show 2,000-hour salt spray resistance and exceptional resistance to caustic soda, ammonia, sulfuric, nitric, hydrochloric acids.

No special preparation of surfaces is required, and the product will air dry for handling in 2–3 hours, force dry within 30 minutes, and infra-red bake in 3–5 minutes to a hard high-gloss finish. For further information, use Reader Service Card

E—489. Unit Spray Washer—A new self-contained spray washer is offered by the Industrial Filter & Pump Manufacturing Company, 1621 W. Carroll Avenue, Chicago 12, Ill. This unit was developed for washing intricate assemblies like typewriters and teletype machines in a very short time without disassembling. In manufacturing, baskets of small parts can be handled.



The unit consists essentially of a welded steel tank, 24 x 24 x 24 inches, with a perforated-steel false bottom for supporting the work. In each corner are four swivel spray nozzles, that direct fine forceful sprays on the parts. An ample supply of solvent is carried in the sump below the false bottom. The tank is supported on a frame of angle iron and a steel base which carries the pumping unit for circulating solvent. The motor and switch are explosion-proof. Four 3-inch casters provide for easy mobility. The unit is finished inside and out with a solvent-resistant paint. The over-all height is 49½ inches. For further information, use Reader Service Card.

E—490. Hardness Tester for Plastic Coated Surfaces—The Model 139 Taber Shear Hardness and Diamond Scratch Tester offered by Taber Instrument Corporation, 111-PL Goundry Street, North

Tonawanda, N. Y., is a precision tool for testing the quality of plastic materials and plastic-coated surfaces to resist scratches, digs, scrapes, and similar physical damage not classed as normal wear.

Both tests are performed with a finely balanced scale beam, calibrated in grams, to which is attached the Taber S-20 or S-30 Precision Ground Contour Shear Tool or the 139-55 Diamond Point Scratch

ONE solvent, ONE price for all jobs

The new Blacosolv is the most stable solvent we've ever offered for metal degreasing. Aluminum, steel, copper and precious metals may be safely and scientifically degreased with the same solvent.

Blacosolv contains a mixture of entirely new and different stabilizers. They are not alkaline materials which neutralize acid *after* breakdown. They are new stabilizers that *prevent* solvent breakdown and possible acid formation. Contains no alkaline materials that can be mistaken for stability . . . no masking agents are added.

G. S. BLAKESLEE & CO.

BLACOSOLV DEGREASERS AND SOLVENT

NIAGARA METAL PARTS WASHERS

G. S. BLAKESLEE CO., CHICAGO 50, ILLINOIS
NEW YORK, N. Y. TORONTO, ONT.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 462.

No Other Process Yields Such Brilliant Zinc Deposits Without Dipping!

If you want a really brilliant zinc plate, adopt this Du Pont process using:

DU PONT "ZIN-O-LYTE" ZINC PLATING CHEMICALS

CHECK THESE OUTSTANDING FEATURES

1. **YIELDS BRILLIANT** blue-white, rust-resistant deposits direct from the bath without *bright dipping!*
2. **GOOD OPERATING EFFICIENCY.**
3. **BATHS EASILY** made up from prepared salts.
4. **SUITABLE** for all types of zinc plating, *particularly barrel plating.*
5. **SATISFACTORY** for use with almost all types of ferrous metals.

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department, Wilmington 98, Delaware

GET YOUR FREE COPY of our manual on plating with "Zin-O-Lyte" zinc plating chemicals. Packed with helpful facts. Just clip this coupon!

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Chemicals · Processes · Service
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Wilmington 98, Delaware

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Firm_____ Title_____

Address_____

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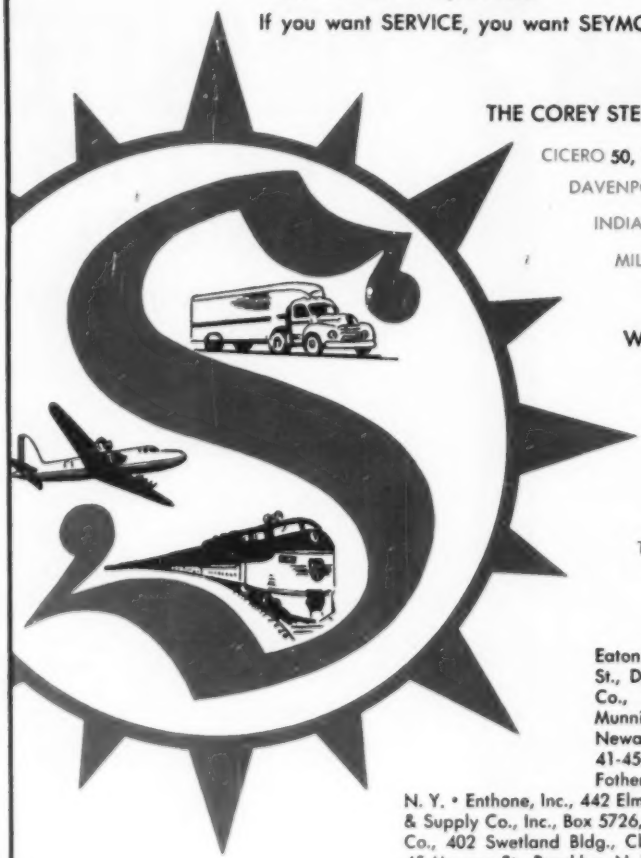
NICKEL SILVER . . . . . PHOSPHOR BRONZE . . . . . NICKEL ANODES . . . . . WELDING ROD . . . . . whatever your requirements may be, specify SEYMOUR for shipment from strategically located distributor warehouses. Write us or consult with your nearest Seymour distributor for shipping dates on mill run quantities.

If you want SERVICE, you want SEYMOUR!



THE COREY STEEL COMPANY (Mill Products)

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DAVENPORT, Iowa, 736 Federal St.

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CINCINNATI 29, O., 3231 Fredonia Ave.

CLEVELAND 14, O., 3700 Perkins Ave.

COLUMBUS 12, O., 851 Williams Ave.

PITTSBURGH 12, Pa., 901 Pennsylvania Ave.

TOLEDO 2, O., 650 Woodruff Ave.

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Eaton Chemical & Dyestuff Co., 1490 Franklin St., Detroit, Mich. • Crown Rheostat & Supply Co., 3465 N. Kimball Ave., Chicago, Ill.. Munning & Munning, Inc., 202-208 Emmett Ave., Newark, N. J. • Somers Bros. Mfg. Co., 3439-41-45 N. Broadway, St. Louis, Mo. • W. M. Fotheringham, 977-81 Niagara St., Buffalo, N. Y. • Enthone, Inc., 442 Elm St., New Haven, Conn. • Clark Chemical & Supply Co., Inc., Box 5726, Indianapolis 7, Ind. • The Gilbert Tramer Co., 402 Swetland Bldg., Cleveland 15, Ohio • Bart-Messing Corp., 45 Morgan St., Brooklyn, N. Y.

THE SEYMOUR MANUFACTURING COMPANY, SEYMOUR, CONNECTICUT

SEYMOUR

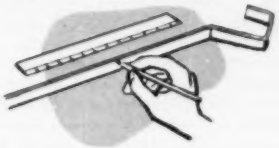
NONFERROUS ALLOYS SINCE 1878

DRIVE-ON SADDLE TIPS ARE Terrific!

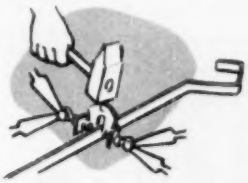
WOW!

Eliminates expensive shop time used to bore and adjust splines

all you have to do is:



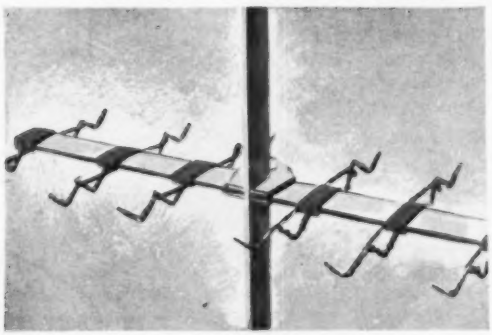
1 Measure and mark Spline

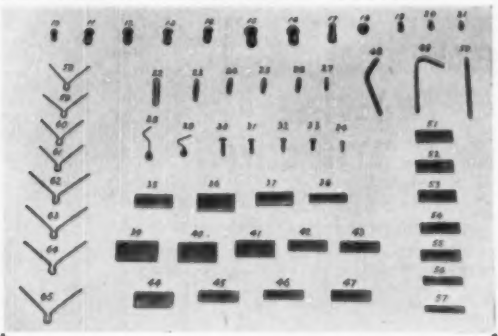


2 Drive-on STANDARD Saddle Tips *

*Patent applied for.

SAVES TIME...SAVES MONEY...HOLDS FIRM





Rides the Spline like a Cowboy

Standard Plating Rack Company

1913-25 N. PAULINA STREET, CHICAGO 22, ILL.
Phone: ARmitage 6-6766

The most modern and efficient rack producing plant in the world
WE CAN FURNISH PARTS FOR YOUR ASSEMBLY OUT OF STOCK

MAIL THE HANDY COUPON NOW FOR MORE INFORMATION

STANDARD PLATING RACK CO. *P
1913-25 N. Paulina Street, Chicago 22, Illinois

Gentlemen: Yes, I am interested in STANDARD SADDLE TIPS. Please have your sales representative call, with a sample of this new—easy-to-use drive on Saddle Tip at no obligation to me.

Name .....

Company ..... Position .....

Address .....

City ..... State .....

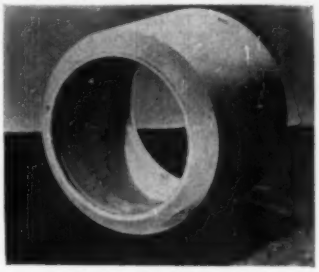
Equipment and Supplies

Tool. A sliding weight provides an adjustment in load from 0 to 500 grams. An extra calibrated weight increases the load capacity to a total of 1,000 grams. For further information, use Reader Service Card.

E—491. Water Curtain Paint Booth—Newcomb-Detroit Company, 5741 Russell, Detroit 11, Mich., offers a water-curtain "Roto-Wash" spray bath in which paint-laden air is drawn into the booth both over and under the water curtain simultaneously. The result, it is claimed, is a more even flow of air across the face of the booth whereby a maximum of paint overspray is trapped in spraying area. The design is also said to offer simplified maintenance. For further information, use Reader Service Card.

E—492. Glassware Cleaner—Wyandotte Chemicals Corporation offers Dural H, an inhibited detergent for washing laboratory glassware by hand, quickly and thoroughly even in hard water, with little or no etching, dissolving laboratory glassware at rates from 2 to 33 times slower than standard detergents. A companion product, Wyandotte Dural M, has been originated for machine washing of laboratory glassware. For further information, use Reader Service Card.

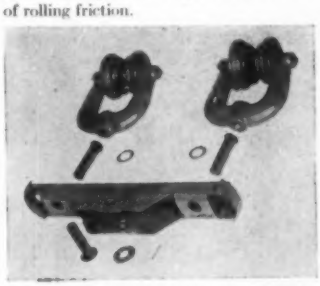
E—493. Corrosion Resistant Rod, Tube and Sheet—A new material, manufactured by Houghton Laboratories, Inc., Olean, N. Y., and available in rod, tube or sheet form, is said to have unusual chemical and electrical properties. Known as Hysol 6000, it is claimed impervious to concentrated hydrochloric acid, unaffected by dilute solutions of



nitric and sulfuric acids, and not attacked by 50 per cent caustic soda. It is odorless, tasteless, nontoxic, may be used at temperatures of 230° F. and has a dielectric strength by the step method of 350 volts/mil. It can be fabricated to close tolerances by ordinary metal or wood-working machinery.

In one test installation Hysol 6000 was used as the drain in chromic acid plating tanks and after over nine months showed no sign of failure or need for replacement. For further information, use Reader Service Card.

E—493. Tramrail Trolley—An improved Ohio Tramrail trolley for use on hand- or electric-powered tramrail systems, transfer bridges, and tramrail cranes is announced by the Forker Corporation, 2117 Random Road, Cleveland 6, Ohio. Operator fatigue is said to be reduced and payloads increased through elimination of dead parasite weight and reduction of rolling friction.



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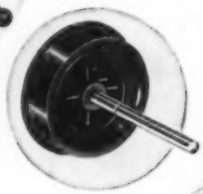

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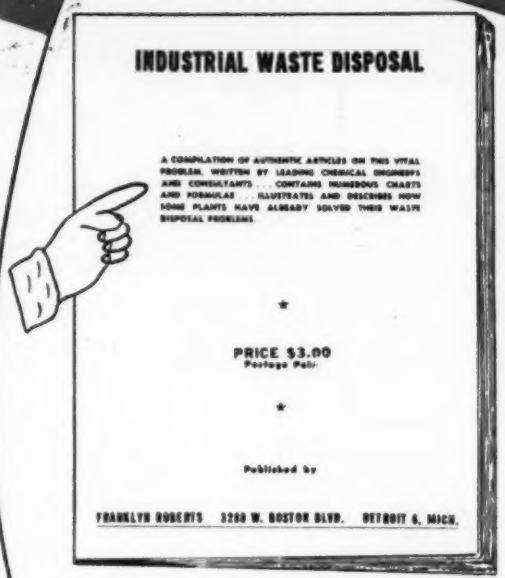
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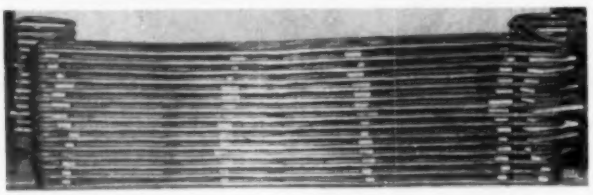

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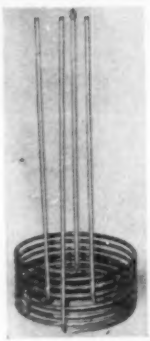

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E—496. Quality Control Indicator—General Electric engineers recently unveiled a new device, called a "quality control indicator", which keeps an automatic, continuous check on reject rates in manufacturing operations and is said to make possible the location and remedy of abnormal production difficulties as quickly as they occur.

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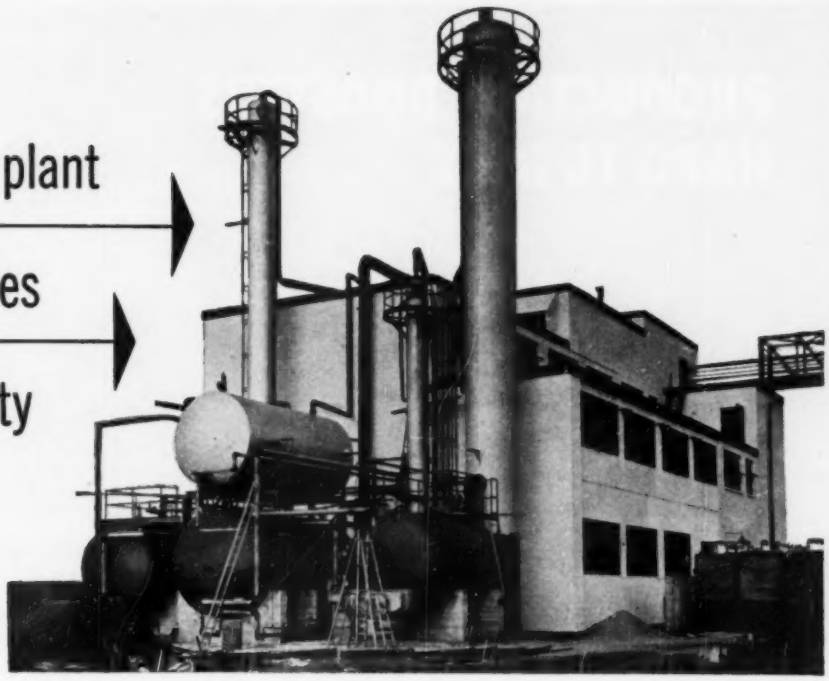

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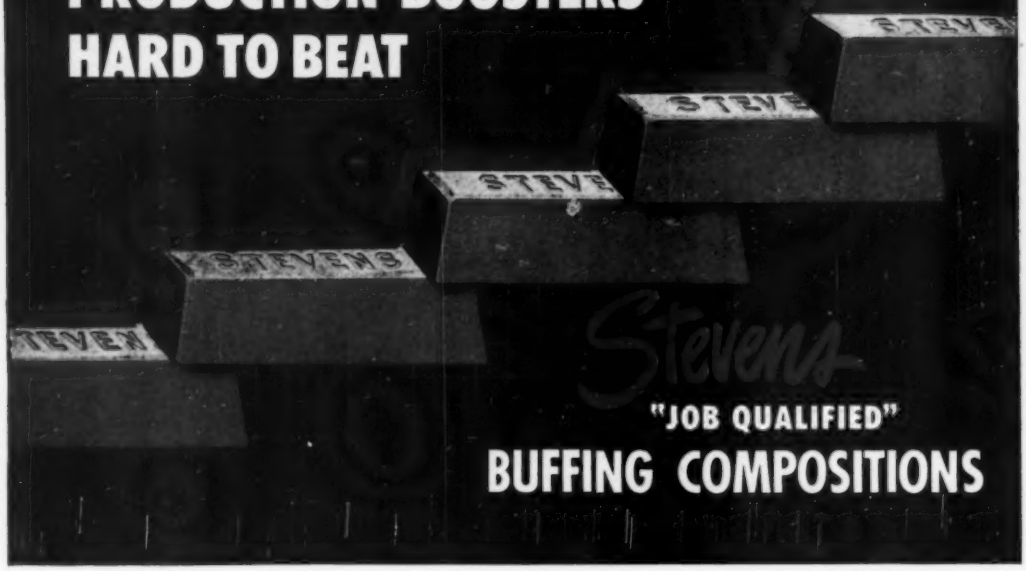

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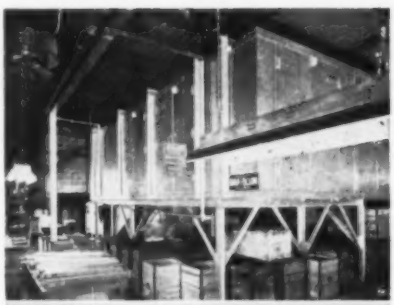

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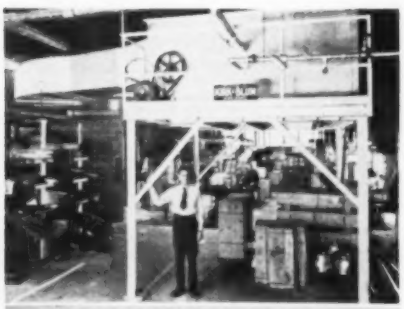

"Make-up" air supply system replaces air exhausted from plant.

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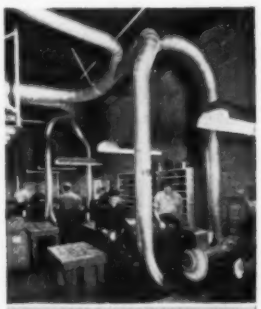

Two KIRK & BLUM Dust Control Systems serve the polishing and buffing room.

Editorial

VOICES OF THE PAST

A MOST FASCINATING BOOK that recently found its way to the Editor's bed table is "Worlds in Collision" by Immanuel Velikovsky. In it the author offers a mass of evidence to show that many geological changes on the earth are not the result of leisurely evolution taking hundred-thousands or millions of years but of catastrophic near-collisions between the earth and comets or planets and between other planets. Some of these cataclysms took place in historic times, at the Exodus from Egypt and in the days of the older Hebrew prophets.

Perhaps most interesting is the nature of the evidence: excavated history, sacred writings and folk lore of peoples all over the world—Hebrews, Egyptians, Finns, Hindus, Chinese, American Indians, and others. Most of these items considered individually have appeared to be but poetic imaginings or horror tales; fitted together chronologically they now seem to reveal historic facts.

Until the days of the Enlightenment, which preceded the French Revolution, a quotation from the ancients was usually sufficient to settle almost any argument. Since that time, and especially since the advent of the Industrial Revolution, we of the West have shown great reluctance to accept statements by our predecessors. In our eagerness to avoid old errors we seem to have discarded old truths—"thrown out the baby with the bath water", as a Swedish saying goes. And so we proceed laboriously to rediscover them. We are amazed when we belatedly learn that the most modern drugs—streptomycin and aureomycin, for example—are purified forms of the witch doctor's and old wife's medicine or that a hundred-year old patent describes our proud invention.

In the electroplating field there is recent evidence that the old timers may have been right when they claimed that their low-current-density nickel plate was more rust protective than our high-current-density deposits. Our most modern combinations of mechanical and electrolytic polishing seem to be an attempt to approximate the excellent polishing obtained before hand polishing became an almost lost art.

When, as at the A. E. S. Boston Convention, we seek to honor those who practiced our profession in days gone by, let us remember that the highest tribute we can pay them is to make use of the experience which they gained so hardly and offer so freely.

Gustaf Soderberg

SUMMARY

This is the last in a series of three papers on the hydrogen embrittlement of steel during electroplating. Quantitative measurements are reported for brittleness of mild-steel and low-carbon stainless-steel wires electroplated with nickel, tin, or lead. Typical baths selected for each metal provided data for an evaluation of the scope of common hydrogen problems, such as brittleness and blistering, likely to be encountered in plating with these metals.

The standardized procedure used in all three studies permits the comparison of a number of chromium, cadmium, zinc, copper, nickel, tin, and lead plating processes. Acid baths are commonly the least injurious, whereas cyanide baths are markedly injurious. Mild steel is seldom measurably embrittled by any process; the stainless steel is embrittled by every process. The Watts nickel bath has the least hydrogenizing action of all processes studied, and in lead plating an exceptional protective action of the thickening plate was found.

HYDROGEN EMBRITTLEMENT IN NICKEL, TIN, AND LEAD ELECTROPLATING*

C. A. ZAPFFE and M. E. HASLEM

Baltimore, Maryland

INTRODUCTION

In two preceding articles in PLATING, an earlier quantitative study of embrittlement of a steel cathode during chromium plating[1] was extended to copper plating[2] and to cadmium and zinc plating[3]. The purpose of these studies was primarily to call attention to the surprising scope of the hydrogen activity in processes where its effects were previously either not recognized or not well understood; and secondly, to provide some quantitative measurement of these effects for a number of the modern plating processes. A general rating of their hydrogenizing propensities can now be made as well as predictions concerning problems which might arise in a plating shop where a process is altered or a new process installed. Also, certain problems in a shop might be solved when the wide scope and the frequently phenomenal behavior of this gas is recognized.

The present report deals with some nickel, tin, and lead plating processes. Since a complete study of all processes would entail an immense amount of work, covering not only many bath compositions and plating variables but also numerous addition agents, the purpose here is to restrict the observations to several typical baths which together represent an important fraction of industrial practice.

EXPERIMENTAL PROCEDURE

Details of the experimental method can be found in the previous papers,[1,2,3]. The constant-rate single-bend test was employed on the same materials and with the same technique. Thus two grades of steel were used—SAE 1020 representing a typical mild steel and AISI 440-C representing a hardenable stainless steel. The mild steel was known from previous experience to be relatively insensitive to embrittlement, the stainless steel to be highly sensitive. Both were in the form of 1/16-inch wire in the cold-drawn condition, and both bent a full 180 degrees around an 1/8-inch pin when in the unplated condition. Table I in an earlier paper[3] contains other details regarding these materials.

Conventional plating procedures were used as recommended in Modern Electroplating[4] or by repre-

*From research conducted in the laboratory of the senior author in conjunction with a project on gas-metal systems sponsored by the Office of Naval Research.

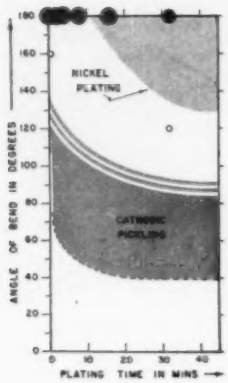

Fig. 1. Embrittling action of a Watts nickel bath compared with cathodic pickling of stainless steel.

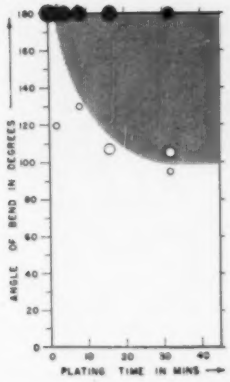

Fig. 2. Embrittling action of a Udylite bright nickel bath

sentatives of commercial houses supplying the chemicals. Duplicate 4-inch lengths of the described wire were plated over a length of two inches and later bent at the one-inch midpoint of the deposit. The wires were cleaned by hand with emery paper to avoid hydrogen pickup from pickling procedures which might have obscured the results. After having been plated, they were immediately rinsed and immersed in ice water at 0° C (32° F) to arrest further changes in the hydrogen condition until the bend test had been performed.

The data are presented in graphs wherein black discs refer to the mild steel and open circles to the stainless steel. Where small black dots are also used, their meaning is indicated on the plot. All specimens at zero plating time could be bent 180 degrees; hence all curves initiate at the upper left corner, even though this cannot be clearly shown in most cases. The development of embrittlement is therefore indicated by the progress of points to the right, representing increasing plating time. For easy visualization of the scope of the injury caused by the hydrogen, the "embrittlement area" is shaded to represent the extent of loss from the original condition of a 180-degree bend.

Results with Nickel Plating

Watts Nickel

Test Conditions:

Electrolyte	240 g/l $NiSO_4.6H_2O$
	45 g/l $NiCl_2.6H_2O$
	30 g/l H_3BO_3
Current density	4 amp/dm² (37asf)
Temperature	50° C (122° F)
Anode	nickel

The data for this historic bath are plotted in Fig. 1. No addition agent was used, since the action of the basic bath was of principal interest. No embrittlement whatsoever is shown for the mild steel, and the stainless steel sustained less injury than in any process yet studied[1,2,3]. As a matter of fact, the two isolated fractures do not permit drawing any type of curve, the stippled area indicating only in a qualitative way that a slight range of embrittlement does exist.

In the same figure a dashed line and a partially shaded area represent the embrittlement of the same stainless wire by cathodic pickling, or "hydrogen plating". The embrittlement in all processes previously studied corresponded closely to this hydrogen-plating area, except for the acid baths. Not even the acid baths, however, showed the freedom from embrittlement indicated here for the Watts nickel bath. Undoubtedly this has been one of the reasons for its immense and continuing popularity.

Udylite Bright Nickel

Test Conditions:

Electrolyte	300 g/l $NiSO_4.6H_2O$
	60 g/l $NiCl_2.6H_2O$
	37.4 g/l H_3BO_3
	0.9 m/l Brightener No. 1
	1.2 g/l Non-Pitter No. 2
	6 g/l Brightener No. 3
Current density	4 amp/dm² (37 asf)
Temperature	50° C (122° F)
Anode	nickel

Since this electrolyte is essentially a Watts bath containing proprietary addition agents, one is not surprised to find that the data in Fig. 2 indicate good behavior from the standpoint of embrittlement. No injury at all is suffered by the mild steel and the stainless steel can still be bent 180-degrees after plating periods of 16 minutes. On the other hand, it is interesting that this proprietary bath definitely causes greater embrittlement than the plain Watts bath. This must be attributed to the addition agents.

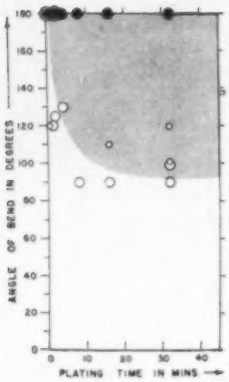

Fig. 3. Embrittling action of an acid tin bath with no additions

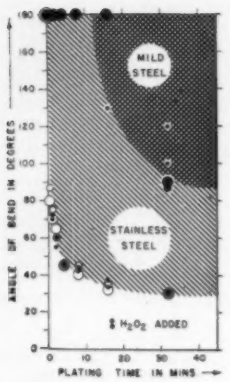

Fig. 4. Embrittling action of an alkaline tin bath with and without peroxide addition

Results with Tin Plating

Acid Tin

Test Conditions

Electrolyte	50 g/l $SnSO_4$ 50 g/l H_2SO_4
Current density	2.2 amp/dm² (20 asf)
Temperature	25° C (77° F)
Anode	cp tin stick

The data in Fig. 3 show that this typical acid bath conforms closely in its embrittling propensity to the acid zinc[3] and acid copper[2] processes. The mild steel is not measurably affected; and the stainless steel, though losing its 180-degree bendability within the first few minutes of plating, does not suffer as much injury as is the case for either cathodic pickling or numerous processes employing cyanide baths.

Alkaline Tin

Test conditions:

Electrolyte	90 g/l $Na_2SnO_3.3H_2O$ 7.5 g/l NaOH 15 g/l $NaC_2H_3O_2$ 2.5 g/l H_2O_2 (20-vol, 6%)
Current density	4 amp/dm² (37 asf)
Temperature	60° C (140° F)
Anode	cp tin stick

In Fig. 4, data are plotted for this typical sodium stannate bath, with and without addition of hydrogen peroxide, which appears to have no effect on embrittlement.

The embrittlement of the mild steel is most unusual and perhaps represents a maximum injury for any of the processes studied in the several researches. The stainless steel shows severe damage, virtually identical with that encountered in cyanide processes or cathodic pickling. Since the bath is alkaline but contains no cyanide, it may be that the great embrittlement caused by cyanide baths is due to their alkalinity rather than to their cyanide content. Cathodic pickling in alkaline solutions, such as 10 per cent sodium hydroxide, causes embrittlement similar to that found in the present work with cyanide baths, and a series of tests involving cyanide in a wide range of concentration results in uniformly severe embrittlement. The point, however, must be left for further study.

Results with Lead Plating

Fluoborate Lead—Concentrated Bath

Test Conditions:

Electrolyte	300 g/l $2(PbCO_3).Pb(OH)_2$ 480 g/l 50% HF 212 g/l H_3BO_3 0.2 g/l glue
Current density	4 amp/dm² (37 asf)
Temperature	30° C (86° F)
Anode	cp lead sheet

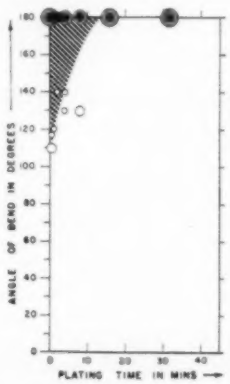

Fig. 5. Embrittling action of a concentrated fluoborate lead bath

The data for the concentrated fluoborate lead bath are unusual in that the stainless steel returns to a 180-degree bend with prolonged plating time as shown in Fig. 5. This is evidence that the first stage of plating is similar to preceding processes so far as hydrogen absorption is concerned, but that the absorption virtually stops on continuation of lead deposition. This behavior is consistent with the known low permeability of hydrogen in lead and is a more definite instance of similar activity previously only weakly indicated for another markedly impermeable metal—cadmium[1]. In other words, as the lead coating thickens, the hydrogen transfer into the underlying steel is much reduced. This is not true for most of the other electroplated coatings.

Fluoborate Lead—Dilute Bath

Test Conditions:

Electrolyte	150 g/l 2 ($PbCO_3$). $Pb(OH)_2$ 240 g/l 50% HF 106 g/l H_3BO_3 0.2 g/l glue
Current density	2.2 amp/dm² (20 asf)
Temperature	30° C (86° F)
Anode	cp lead sheet

Standing as a single exception to the whole series of plating baths studied in this and in preceding researches, the dilute fluoborate bath is virtually noninjurious, even to the stainless steel. The bend values reflect such minor damage that they have not been plotted but are presented in Table I.

TABLE I. EFFECT OF PLATING TIME ON EMBRITTLEMENT IN THE "DILUTE" LEAD FLUOBORATE BATH

Plating Time minutes	Angle of Bend in Degrees	
	SAE 1020	AISI 440-C
0.5	180, 180	180, 180
1	180, 180	180, 180
2	180, 180	132, 180
4	180, 180	180, 180
8	180, 180	180, 180
16	180, 180	135, 180
32	180, 180	180, 180

Only two wires of the entire series fractured, and these at large angles of bend. This represents the most noninjurious plating bath of any yet studied, with the possible exception of the Watts nickel bath.

Some curiosity accordingly arises concerning the hydrogenizing characteristics of other lead plating baths, a number of which are now on the market and appear rather promising from a commercial standpoint. Researches should be conducted on these baths and on the effects of additions agents, which may occasionally be found to change greatly the hydrogenizing characteristics of the bath, either advantageously or disadvantageously.

Conclusions

A preliminary survey of certain principal plating baths has been made to call attention to the genera scope of the hydrogen problem in electroplating and to present some quantitative measurements for phenomena which, although not clearly defined, have long been observed qualitatively in the plating shop.

On the basis of tests with several typical nickel, tin, and lead electroplating baths, the following tentative conclusions can be drawn:

1. As in previous studies, the mild steel is relatively nonsensitive to hydrogenizing, whereas the stainless steel is particularly sensitive.
2. The conventional Watts nickel bath shows the least embrittlement of any process yet studied, with the single exception of the "dilute" fluoborate lead bath.
3. A commercial nickel bath with brightening and nonpitting agents added to the Watts electrolyte exhibits somewhat increased embrittlement propensity.
4. Acid tin plating causes about the same embrittlement as the acid-zinc and acid-copper processes previously studied.
5. Alkaline tin plating causes embrittlement of mild steel exceeding that observed in any other process and embrittlement of stainless steel virtually identical with that from cyanide plating processes for other metals.
6. Hydrogen peroxide added to the alkaline tin bath has no effect on embrittlement.
7. The "dilute" fluoborate lead bath causes the least embrittlement of any process yet studied, whereas the "concentrated" fluoborate bath initiates fairly severe brittleness which rapidly disappears with prolonged plating time.

Acknowledgment

The authors acknowledge the assistance of the Office of Naval Research for partial sponsorship of this work and wish to thank the several representatives of commercial companies who contributed samples and specific information on their products.

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leaders in the industry xxv

m. b. diggin

MYRON BRADFORD DIGGIN, Hanson-Van Winkle-Munning Company's energetic technical director, was born in Matawan, N. J., on November 1, 1904, and still resides there.

The loud explosions and spectacular fires generated in the course of his high-school experimentation had two results. First, he decided to learn more about the powerful agents involved and matriculated at Weslayan University, majoring in chemistry. Second, he resolved to be able to get away from them as quickly as possible and was soon found on the varsity cross-country squad. After he had received his B.S. degree in 1926, Mr. Diggin accepted a position on the teaching staff of Wesleyan. Here his most enjoyable and, at the same time, most exasperating duty was to teach a class of nurses every Saturday. He was awarded his A.M. degree in 1928, having done his thesis work in the field of petroleum chemistry.

Mr. Diggin's industrial experience began when he established a consulting laboratory in New Britain, Conn., to test and compound high anti-knock gasolines. The next year he returned to his native town and received an appointment as supervisor of bridges in Monmouth County. He remained in that position long enough to make the claim that he is the third generation of bridge builders in the family. The chemical field still beckoned, however, and soon he joined the technical staff of the American Colloid Company in New York City.

His work in the electroplating field began in 1930, when he accepted a position as chemist with Hanson-Van Winkle-Munning Company in Matawan. He has remained with this firm ever since, rising to chief chemist in 1933 and to technical director in 1946.

Mr. Diggin's researches have resulted in a number of developments and patents of commercial importance, particularly in the deposition of cadmium, zinc, and lead, in rack coatings and anode diaphragms, and in regenerative plating systems. He is the designer of the electroplating-control table which bears his name. Author of numerous articles in technical and trade publications, he has also lectured extensively.

Society memberships include the Electrochemical Society, American Chemical Society, and American Ordnance Association. He has also been active in the work of Committee B-8 of American Society for Testing Materials.

In the American Electroplaters' Society he was Chairman of the 1947 Paper Awards Committee. For several years he has been a member of its Editorial Board, and in that capacity organized the Symposium on Leveling to be held at the Convention this year. He is also chairman of Project Committee No. 4 of the A. E. S. Research Committee and President of the Newark Branch. In 1946 he was awarded the Society's Gold Medal.

On the personal side, Mr. Diggin has just completed six years' service on Matawan Township School Board, having been President for four years. He also served one year as President of Monmouth School Boards Association and is presently serving on Monmouth County Better School Health Board and on a committee appointed by the Board of Freeholders to investigate technical and trade education in the county.

Hobbies are photography, music, and propagation of broadleaf evergreens. In 1934 he married Elna Nelson in Matawan. They have two daughters, Diana, 10, and Candace, 3.

LOW COST FINISHING WITH ROTO-FINISH*

C. H. CASTLE

Roto-Finish Company, Kalamazoo, Mich.

THE FINISHING OF A metal part after it has been fabricated is often considered to be one of the most expensive manufacturing processes in the production of a salable product. The principal reason for the high expense is the amount of manual labor required to remove edge roughness, burrs, excess metal, and numerous surface irregularities.

As a result, many cost-conscious individuals have sought to devise means of reducing or eliminating as much of the finishing labor as possible. About 1885 an Englishman by the name of Edmunds conducted systematic experiments and developed what is generally considered to be the original barrel-finishing processes. During the next fifty years, development of tumble finishing was highlighted by the introduction of several new types of processing barrels and finishing media. Processes used during this period were for the most part closely guarded trade secrets. This particular point does not pertain to tumbling alone, but was a fairly common condition in the field during that period.

Development of what is now called Roto-Finish began in the middle 1930's. Since then a series of engineered processes has been produced which are unique in the field of mechanical finishing.

The Processes

At the present time, Roto-Finish consists of a number of basically similar processes using various types of processing media and chemical compounds in specifically designed equipment. These processes can be used either separately or collectively on all types of metal parts and many plastic items. They differ from older tumbling processes by closer control of processing variables. The mass action being regulated, the parts being processed are not tossed about in a random fashion and thus avoid undesirable impingements. They are subjected to controlled abrasive action which may be varied to suit the requirements.

The Parts to be Finished

The finish obtained depends to a great extent on the nature of the part being processed and the results required. If high-quality finishes are needed, processing standards must be closely maintained. Small parts weighing less than four ounces and having a cubic volume of less than four cubic inches can be finished with less difficulty than heavier and larger parts. If deburring, descaling, or the removing of excess metal is the main consideration or if a noncritical finish is acceptable, heavier and larger parts can be processed without difficulty. In general, a part having sharp corners and edges, large flat areas, or poor symmetry and balance is difficult to process. Hard parts offer fewer problems than soft parts. Massive, heavy parts often require special considerations. The ideal part is one of small size, having curved surfaces, no deeply recessed areas, and even distribution of mass. Large quantities of such parts can be processed with few difficulties, while critically shaped and sized parts may prove troublesome even in small quantities.

By processing large quantities of parts at one time, production of finished parts is generally stepped up. This is particularly true of small, intricately shaped parts which are normally difficult to finish by manual means. Production schedules can be easily maintained by setting up standardized operating procedures which require a minimum of supervision.

It is not always possible to obtain the results desired on a particular part in a single operation. Instead it may be necessary to use a series of operations and to vary processing conditions in each operation. It is significant that each different part processed presents a similar but slightly different problem, and to obtain the desired results operating conditions must be adjusted to fit the occasion.

The Equipment

Two distinct types of equipment are used. One makes use of a horizontal processing cylinder; the other employs an open-end processing container and is com-

*Additional information is found in the article by A. P. Schulze, PLATING 35,911 (1948).

monly called a "tilt" or "oblique" barrel. Equipment having a horizontal cylinder can be used to process a greater variety of different items and generally produces better results in a shorter time. The principal advantage of the "tilt"-type apparatus is ease of operation.

Equipment employing a horizontal cylinder can also be separated into two classifications, each having its respective advantages. One of these makes use of a processing cylinder of large diameter and relatively narrow width, while the other employs a small-diameter long-length compartment. The large-diameter compartment is useful for a greater variety of operations and usually provides higher production and requires less processing time to produce acceptable finishes. Results are often superior because of the more effective combination of action and pressure.

Processing cylinders may be of many shapes and sizes. Generally, the eight-sided, or octagonal, shape is considered best; it more nearly approaches the round cylinder, which produces the most uniform action but tends to allow slippage of the processing media when operated at low speed.

Size of compartments may be varied to meet production demands. For ease of handling and moderate production, processing equipment with a 36-inch-diamter octagonal cylinder divided into two compartments, each twenty-two inches in width, is considered ideal. Wider compartments providing greater capacity may be used, but they tend to be too cumbersome for efficient operation. Cylinders may have one or more compartments; however, multiple-compartment cylinders tend to give less efficient operation, because stoppage of the cylinder for one compartment necessarily stops it for all compartments.

Cylinders should be lined if the parts to be processed are of a precision type or if the finish desired is critically important. Linings may be wood or rubber for general processing. Rubber linings, although more expensive than wood, have the advantage of lasting many times longer and not requiring the continual presence of moisture. Neoprene linings may be used where the presence of oil prohibits the use of rubber Steel plates may be used if an unlined cylinder is acceptable; they prevent the processing media from abrading the cylinder shell and can be replaced as they wear out. Unlined cylinders are obviously more noisy in operation, and while this is probably of minor importance, in most instances it is obnoxious.

Power needed to operate the processing equipment may range up to five horsepower or more for standard units. The precise power requirement depends upon the weight of the mass being processed and the speed of rotation. The power unit on all large equipment should be provided with a magnetic brake, as it is impossible to load or unload the processing cylinder efficiently unless it is held in a fixed position. Forward and reversing switch equipment is also highly desirable.

Accessory equipment required for systematic operation includes hoist pans, overhead bridge-type hoist, chip bins, separating screens and equipment, rinse tanks, and drying equipment. All greatly facilitate production.

Special equipment is often desirable to solve a particular processing problem. Units designed with a door on each flat of the octagon and arranged with fixtures secured to their inside surface have proven successful for processing parts which are too large to be finished unattached in conventional equipment.

The layout and arrangement of processing equipment and accessories is of major importance. Adequate drainage should be provided, as large quantities of waste solution and rinse water must be disposed in an effective manner.

Operating Variables

Principal operating variables are the peripheral speed of the cylinder; the type, size, and amount of processing media; the type, size, weight, and amount of parts being processed in one load; the ratio of the amount of processing media to the amount of parts processed; the type and amount of chemical compound used; the amount of water used; and the length of time of processing.

The standard operating speed of the 36-inch cylinder is 20 rpm, which provides a peripheral speed of approximately 190 feet per minute. If cylinders of other diameters are used it is advisable to adjust their speed accordingly for comparable results. Cylinder speeds as low as 6–8 rpm may be useful for finishing fragile parts or delicate surfaces. Speeds of 30–35 rpm may help when a large quantity of excess metal is to be removed, where processing time must be short, or when the resulting finish is not of major importance.

Processing media may be composed of many different types of material; however, there are only a few kinds that produce satisfactory results on a wide variety of parts having various finishing requirements. Grinding, deburring, descaling, or general cutting down of metal surfaces is carried out using a natural material known as commercial granite. Britehoning, an operation producing extremely fine, semilustrous surface finishes, which may have a micro inch reading of 5 rms or less, uses a softer natural-mineral chip, of limestone. Constant research and over ten years' experience have proved that, in general, natural commercial granite and limestone produce the best and most economical results. Chips of these materials may vary from less than 1/16 inch to about 2 inches in diameter. The processing mass may be composed of a single size chip, or it may be a mixture of large and small sizes, depending again on requirements. For the highest luster and finest finishes, highly polished hardened steel balls and other shapes are used. Their size is usually about 1/8 inch in diameter but may vary from 1/16 to 5/16 inch or more in diameter, depending on the parts being processed.

The amount of processing media required is usually

fixed at an amount which will fill the compartment from one-half to two-thirds full. If the operation is used mainly for deburring or cutting down, a small processing mass may be advantageous, because slightly more action is obtained when the mass half fills the compartment. Similarly, better results are usually obtained in finishing operations when the compartment is two-thirds full of processing media.

The ratio of chip mass to work load is varied. For deburring and cutting down the ratio for the average adaptable part will normally be 5 parts chip mass to 1 part of work, but this ratio may vary from 2–to–1 to about 10–to–1 depending upon the part and the results required. For finishing operations with chips the ratio generally varies from 5–to–1 to about 15–to–1 with an average of about 7–to–1. Finishing operations using steel balls may vary over a wider range depending on the part. Some very adaptable parts may be processed satisfactorily with 2–3 parts of steel balls to 1 part of work load, whereas a less adaptable part may require 30–40 parts of steel balls to 1 part of work. Generally, the media ratio is quite high for the average item.

The use of suitable chemical compounds with each of the processing media is necessary for many reasons. Each process requires a different combination. Each compound has characteristics which make it useful for producing certain desired effects when combined with the proper processing media. Thus compounds provide lubrication for the chip mass and work load; prevent corrosion or tarnish of parts; aid in cleaning the work, the chip mass, and the processing compartment; alter processing-solution viscosity, thereby varying the processing action; provide water conditioning when necessary; provide abrasive for faster cutting and scouring; prevent chip surfaces from becoming inactive; promote coating of the finishing chips when required. Certain compounds have a solvent action for scale and rust. They also may improve the suspending action of the processing solution. It is evident that no one material could do all these things. For this reason, most compounds are a blend of many ingredients prepared to meet certain requirements Nonferrous metals sometimes require a different type of compound than ferrous metals, but for many operations the same materials may be used.

The amount of water used in the operations varies from several inches below the level of the combined processing mass and work load to several inches above this mass. The standard amount is usually two inches above the combined mass. Low water level promotes a harsh action, whereas a high level tones down the action.

The time required for obtaining results using any particular process depends upon the condition of the parts prior to processing, the results which are required, and the operating conditions. Soft metals require shorter processing cycles than hard metals for similar results. Deburring cycles are shorter than cutting-down cycles, and finishing cycles are usually longer than deburring cycles but shorter than cutting-down cycles. Finishing cycles using steel balls and other hardened-steel shapes are comparatively short compared to operations using chips. However, they remove no metal, their action being confined to smoothing of surfaces irregularities and improving the luster of the finish.

Time for processing adaptable parts is given in Table I.

TABLE I. PROCESSING TIME FOR ROTO FINISH

Operation	Time, hours
Deburring	¼– 8
Descaling	1– 4
Cutting-down	4–36
Semilustrous finishing	
with chips	4–16
with steel balls	¼– 2

The results are accomplished by the abrasive action of the chip mass on the exposed edges and surfaces of the parts. The pressure exerted by the weight of the processing mass and the force of its motion are important factors. Large chips cut faster and abrade more than small chips, because the mass and force of a large chip is greater than those of a small chip. Conversely, a small chip may be used to produce a finer finish because the mass and force behind it are relatively low in relation to its size and its contact area.

In the processing of metal parts with mineral chips, the most exposed portions of the part being processed are abraded or finished first. The general sequence is: corners, edges, convex surfaces, flat surfaces, concave surfaces, and deeply recessed or unexposed areas. This order should not be mistaken to mean that there is a selective action in the processing compartment; all areas are being abraded and finished simultaneously, only the intensity of the forces and actions vary in the different locations.

Precautions

One of the most important considerations for satisfactory results is cleanliness. The processing media and compartment must be kept free of all contaminating foreign matter. Offensive odors are often a sign of contamination and should be eliminated as soon as possible.

Maintenance of processing mass and chip size is important, as variations will often affect the results adversely. The individual chips gradually become smaller during processing, and the size of the processing mass likewise becomes reduced. Often when a particular size chip must be used to avoid lodging in holes or slots, it is necessary to separate the undesirable smaller chips from the mass and replace them with chips of correct size. Even when the chips do not

(*Continued on page 633*)

CHOICE OF ELECTRODEPOSITED COATINGS*

CLARENCE H. SAMPLE

The International Nickel Company, New York, N. Y.

(The first portion of this article appeared in the May, 1950 issue of PLATING)

Corrosion Behavior of Typical Commercial Coatings

Much information is available in the literature on the corrosion behavior of metals and metallic coatings. To present it all adequately in the available space is not feasible. Therefore only the general corrosion behavior of a few typical commercial coatings is included here, and it is suggested that the reader consult the references cited for detailed performance data on particular coatings in specific environments.

Zinc Coatings

Electrodeposited zinc coatings are used primarily for the corrosion protection of iron and steel products. Formerly appearance was generally of minor importance. However, the development of bright zinc coatings[18] and supplementary treatments such as the various chromate dips[19], the application of clear lacquers, etc., which enhance their appearance and durability, have opened up new fields in consumer goods where an attractive appearance is desirable.

It is generally agreed that in most environments the corrosion of electrodeposited zinc coatings exhibits a linear relationship with time[20–22], that is to say, the protective value is directly proportional to their thickness. The rate of corrosion, however, varies with the particular environment to which the coatings are exposed, being highest (approx. 0.0002 inch/year) in outdoor industrial locations and lowest (approx. 0.00003 inch/year) in outdoor rural areas[21–24]. The higher rate in the industrial atmosphere has been attributed to the presence of sulfur compounds, which when combined with rain and dew form dilute sulfuric acid. This in turn prevents the formation of the somewhat protective basic zinc carbonate film normally present on zinc surfaces exposed to rural atmospheres.

Except for tropical locations, the protective life of electrodeposited zinc coatings exposed to indoor atmospheres has been estimated to be at least five times longer than that of coatings of the same thickness exposed to the outdoor atmosphere in the same locality[25].

Zinc coatings are particularly susceptible to corrosion with the formation of bulky, white corrosion products when exposed in warm and humid sheltered locations, where surface condensation frequently occurs. It has been reported[26] that this type of corrosion was particularly troublesome on Government equipment in the tropics and that the use of chromate-type supplementary treatments was only partially effective in preventing it.

Cadmium Coatings

The corrosion protection characteristics of cadmium coatings are similar to zinc coatings. Their protective value in outdoor industrial atmospheres, however, has been reported inferior to that of zinc coatings of the same thickness[20,21]. Cadmium coatings, however, exhibit certain other characteristics which are advantageous. For example, electrodeposited cadmium coatings are readily solderable and provide a lustrous white protective finish, a combination which makes them particularly desirable for use on radio chassis and other electrical equipment where solderability and pleasing appearance are required. Also, cadmium coatings are much less susceptible than zinc coatings[27] to "white powder" corrosion resulting from condensed atmospheric water vapor. In this connection, however, it should be pointed out that the cadmium coatings are susceptible to another type of "white powder" corrosion when confined to warm stagnant atmospheres containing organic fumes[27,28] such as are derived from the drying oils in paint, acetate-butyrate-type resins, etc.

Chromium Coatings

Chromium coatings exhibit a high degree of corrosion resistance in atmospheric exposures. With coatings thicker than approximately 0.0001 inch, the protective value increases in proportion to the coating thickness. Chromium coatings approximately 0.001 inch thick applied directly to steel test panels gave almost perfect protection for seven years of exposure to the outdoor atmosphere in New York City[29]. The relatively high cost of applying thick, potectirve chromium coatings, however, precludes their use in the field of decorative finishes. As might be expected from their extreme discontinuity, thin chromium coatings, for example those of the order of 0.00002 inch thick (the usual thickness of "decorative" chromium plate), have practically no protective value when applied directly to steel or brass. They are, therefore, almost always applied over a nickel or copper-nickel

*This article is the second portion of a lecture delivered at a Symposium on Electroplating held during the Fall of 1947 at the Wayne University, Detroit, Mich.

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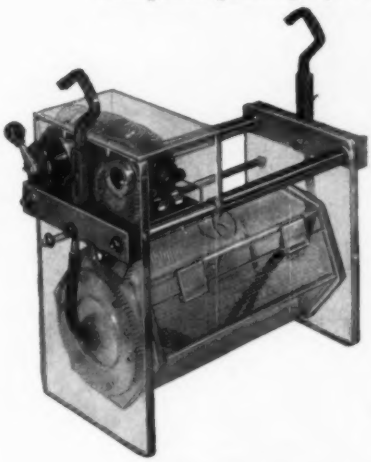

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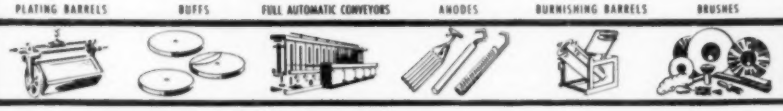

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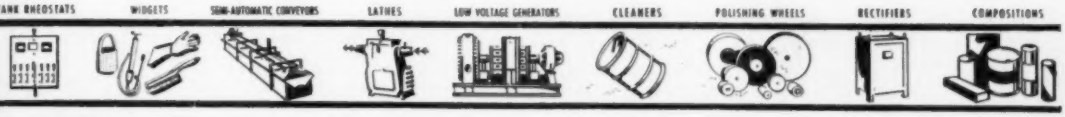

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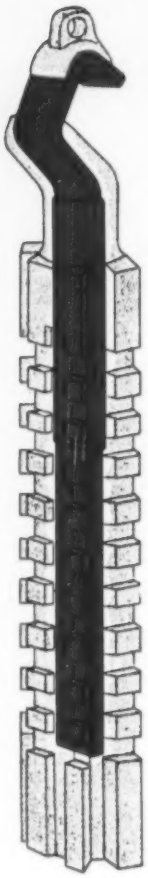

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"COPPER CORE" Chromium Anode

Fabricated With NALCO METAL

- **This Anode** will conduct 250 amperes based on copper area alone.

  Natural flow of current to parallel edges makes entire surface self-cleaning, insuring complete saturation, instant distribution of current, and unusual throwing power. Greatly reduces plating time for a given thickness of deposit.

- **"Copper Core"** distributes current equally throughout the entire length of anode.

  The copper core is insulated from the lead casing above and below the solution level—which prevents flow of heavy surface currents and burning off at solution line. Conductivity is uniform at all solution levels, regulated only by the cathode depth.

- **"Copper Core"** and point current construction aids in immediate coverage.

  A one-piece copper hook maintains perfect contact — no heating at point of contact, no current failures to solution. "Copper Core" Anodes do not warp out of shape.

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undercoating which provides the required corrosion protection to the basis metal, the thin chromium serving to maintain a bright tarnish-free surface. The protective value of such coatings applied to various basis metals has been studied by several investigators, and their results have been reported in the literature[30]. Currently, Subcommittee II of A. S. T. M. Committee B-8 has exposure tests in progress for the purpose of establishing the relative protection value of nickel-chromium versus copper-nickel-chromium coatings applied to high carbon steel[31].†

The extreme hardness and excellent wear resistance of chromium deposits are widely used to advantage on cutting tools, gauges, and other articles subject to wear and erosion[4,32].

Lead Coatings

As reported by Subcommittee II of A. S. T. M. Committee B-8 and others[33], electrodeposited lead coatings furnish a high degree of corrosion protection in industrial atmospheres. Coatings of the order of 0.0002 inch thick give almost complete protection to steel test panels after about 3 years' exposure in New York City. In marked contrast to the behavior of zinc coatings, lead coatings exhibit relatively poor corrosion protection of steel in rural locations. Thus, it would appear that the presence of the sulfur gases in the atmosphere actually work to advantage insofar as the protective value of lead coatings are concerned.

Since electrodeposited lead coatings are usually dull in appearance initially and tend to stain and darken with continued exposure, they generally are not considered suitable as decorative coatings. The resistance of lead to sulfuric acid is frequently employed to advantage in the use of electrodeposited lead coatings on the hardware associated with lead storage batteries.

Nickel Coatings

Of all the electrodeposited coatings nickel is perhaps most widely used for applications where both a pleasing appearance and corrosion protection are required. Nickel exhibits excellent resistance to corrosion in most atmospheres[34]. When exposed to industrial atmospheres, however, nickel surfaces are subject to "fogging"[35], for which reason they are usually covered with a thin layer of electrodeposited chromium to maintain an attractive lustre. In other applications, protective nickel coatings are covered with gold, silver, platinum, tin, or other metals to provide special surface properties. Heavy electrodeposited coatings of nickel (e. g., those more than 0.002–0.003 inch in thickness) appear to have about the same corrosion characteristics as wrought nickel sheet and, like other electrodeposited coatings of the electropositive type, provide corrosion protection to the extent that they completely envelop the basis metal to which they are applied[20,31]. Due to their relatively low cost and desirable physical and chemical properties, nickel deposits are becoming increasingly important for the salvaging of worn or mismachined parts that are subject to wear. Relatively thick electrodeposited nickel is also being used to advantage to protect steel pipe and other equipment in the chemical, petroleum, food processing, and paper industries.

Tin Coatings

In the atmosphere, tin appears to corrode at a rate which after the first few days is linear with respect to time[36]. In keeping with the behavior of other metallic coatings, the protective value of electrodeposited tin coatings increases with the thickness applied. Electrodeposited tin coatings, however, are rarely used solely for corrosion protection. They are usually dull or matte in appearance as deposited and tend to darken and stain when exposed to the weather.

The most extensive application of electrodeposited tin coatings is in the production of electro-tinned sheet for can stock. In this case, the coatings are extremely thin (0.000015–0.00006 inch thick as against about 0.00009 inch for the thinnest commercial hot-dipped coating) and, as is to be expected, contain many discontinuities which extend through to the basis metal. Thus their protective value against exposure to the weather is not high. They do, however, provide remarkably good corrosion protection to the interior of cans packed with a variety of foods and appear to have a firmly established position in the industry.

Electrodeposited tin coatings are also used to enhance the solderability of electrical equipment such as terminals, wire, etc. It has been observed that the solderability decreases with the length of time the coatings are exposed to the atmosphere, and also that it is influenced by the type of basis metal to which they are applied, as well as by their thickness[37].

Copper Coatings

As might be expected from the corrosion characteristics of the parent metal, electrodeposited copper coatings tend to tarnish and stain rapidly when exposed directly to the atmosphere. For that reason they are rarely used alone in applications where a durable attractive surface is required. They are widely used, however, in combination with nickel and chromium coatings, especially on zinc diecastings.

As with other electropositive coatings, the protective value of electrodeposited copper depends primarily on the degree to which it envelops the basis metal. This in turn is a function of its initial thickness and its own resistance to corrosion in the environment to which it is exposed.

It should be pointed out in this connection that while the usual thin decorative chromium coating can be applied directly to protective coatings of copper, such combinations are generally unsatisfactory from

†A brief description of these tests, together with an analysis of the inspection data after about one-and-one-half years of exposure was presented by Dr. H. A. Pray, Chairman of Subcommittee II of Committee B-8, before the June, 1949 meeting of the Society of Automotive Engineers at French Lick, Ind. An important conclusion drawn from this analysis is that "The plated steel on the exterior of automobiles will retain its decorative value over a longer period of use if the plate includes a liberal thickness of nickel, deposited either directly on the steel or over a copper undercoat. The thickness of the nickel is the important factor."

the appearance standpoint due to the gradual accumulation of relatively insoluble copper corrosion products on the surface of the chromium.

During the war, electrodeposited copper coatings were widely used on the steel chassis of special communication equipment to provide electrical shielding.

Gold and Other Noble Metal Coatings

Electrodeposited gold and other noble-metal coatings such as silver and rhodium are extensively used in applications where special surface effects are required. These include such items as jewelry and tableware, as well as electrical components and searchlight reflectors. Because of the metal costs the noble metals are rarely used for corrosion protection alone; when corrosion protection is required, they are usually applied over protective coatings of copper or nickel. In such cases, especially in the presence of an electrolyte, the interposing protective layer of copper or nickel should be sufficiently thick to be free from "pinholes" as otherwise intense galvanic action between the noble-metal coating and the basis metal will occur due to the relatively large potential difference between them.

Costs

Cost *versus* performance of electrodeposited coatings is probably the principal determinant in the selection of a plated coating in preference to a competitive finish or material and is also important in the selection of the particular metal to be applied and its thickness.

The costs of electrodeposited coatings vary widely depending upon several factors, including (1) the kind and amount of metal deposited, (2) the size and shape of the article to be finished together with the quantities involved, (3) the kind and surface quality of the basis material from which the article is made and the type of surface finish required, and (4) the method of handling, including the cleaning and plating processes employed. It will be apparent that most of these factors are interrelated and will vary greatly depending upon the particular job. An instructive analysis of various finishing costs, as applied to different types of parts, has been published[38] and shows that the amount of labor required is by far the largest factor in the cost of producing electrodeposited finishes.

In some applications, e. g., those requiring considerable hand polishing and buffing, the thickness of the coating can be increased considerably (with a corresponding improvement in its performance) at relatively little added cost. In other applications, such as in the continuous plating of strip or wire, doubling the thickness of the coating may more than double the cost, since with a given machine and fixed plating conditions only half as much finished product can be produced in a given period of time. In such applications, therefore, changes in equipment or operating conditions may be indicated in order to secure the advantages of improved performance which results from increased coating thickness. Other things being equal, increasing the current density acts to lower costs because of the reduction in time required to apply a given thickness.

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(Continued on page 633)

RAZOR MANUFACTURE

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THE TWENTIETH CENTURY had just entered upon its history-making course when a product was introduced in America which was to change the face of half the world's population. Although its introduction attracted no particular attention, few inventions have so swiftly swept into world-wide everyday use.

The invention was the safety razor—the inventor, King C. Gillette. His patent application was filed on December 3, 1901 and was granted on November 15, 1904.

The first year of production, 1903 saw fifty-one, razors and fourteen dozen blades sold. By 1908, yearly blade sales had passed the one and one-quarter million dozen mark, and by 1917 annual razor sales had reached the million plus mark with blade sales of nearly ten million dozen. In less than twenty-five years the Gillette Safety Razor Company had factories, branches, or agencies in every civilized country of the world.

A safety razor is a utilitarian device of utmost simplicity. Yet to manufacture this tool and its companion blade requires eight buildings of from six to nine stories each, with floor space totaling eighteen acres.

Since World War II, the entire Gillette plant has undergone a rearrangement in the interest of greater efficiency and better working conditions. In the Razor Division, for example, the tumbling, bright-dipping, and barrel-plating facilities have been modernized and relocated in the center of the building in order to provide a continuous flow of production through successive operations without backtracking of stock.

The barrel-finishing room is laid out to provide as little idle time for the equipment as possible. Tumbling barrels have been modified so that parts and media are unloaded into hoist pans without separation. A closed monorail loop carrying two air hoists makes it possible to reload and start a barrel while its previous load is being separated in a stationary screening unit. Air hoists eliminate the hazard of electric shock due to wet floors, and all barrel controls are served by low-voltage wiring for the same reason.

"Safety and Good Housekeeping Go Hand in Hand" is a Gillette by-word. This point is particularly exemplified in the acid room where good lighting, wide aisles, acid-proof tile floor, stainless-steel tanks, and glass-sheathed Transite duct-exhaust systems simplify the problems of maintenance and good housekeeping.

There are three fullautomatic plating machines: one for bright nickel, one for gold, and one for bright nickel and gold. The base metal throughout is copper or brass. All parts to be gold plated and all buffed nickel parts are processed in the fullautomatics. All other compounds are nickel plated in barrels.

Some details of the plating practice are of interest. A simple color code system is used to route racks through the plating machines. Durable yet inexpensive poultry leg bands in bright colors are attached to the rack handles on racking and provide quick identification of lot number as well as finish desired.

The function of the nickel plate is to provide a noncorroding surface even after the substantial gold deposit has worn through, thus greatly increasing the life of the razor.

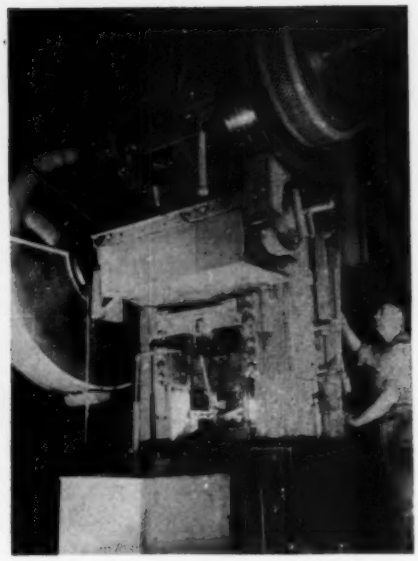
Nickel-solution circulation pumps are equipped with water-sealed stuffing boxes. This precaution prevents ingress of air around the impellor shaft, a common source of the dissolved air which causes orange-peel type of pitting. Water is fed to the pump glands by gravity with a static head of about 18 feet from a float tank in the penthouse.

Dragout rinses following gold plating are pumped at regular intervals to a central tank for reclaiming. The ultimate process, continuous reclaiming for salvage of the precious metal from this rinse water, is still in the development stage.

In order to produce shaving instruments of consistently high accuracy, all functional dimensions must be held to close tolerances throughout the manufacturing and finishing operations. For example, not only must allowance be made for the amount of metal removed by buffing operations but also for the amount of metal added by the nine-minute long bright-nickel plating operation.

Control charts and sampling plans are in constant use in the finishing departments, as well as in the mechanical departments. Such techniques provide rapid detection of tendencies to deviate from standard operating conditions, so that remedial action is taken before real trouble occurs. In addition, constant emphasis by management on the importance of maintaining and always striving to improve quality is reflected in the attitude of the employees at all levels of the organization.

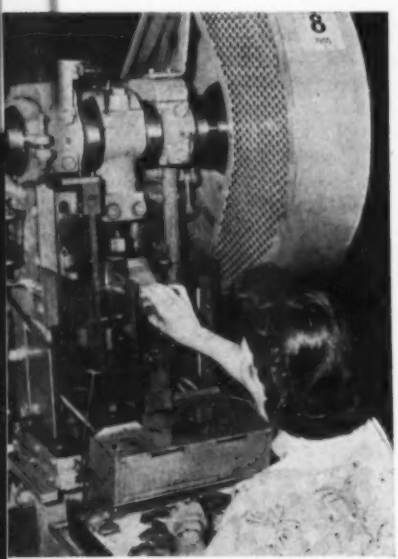
A view of the Materials Inspection Department through which all materials, supplies, and equipment must clear for checking on dimensions, physical and chemical properties, etc.

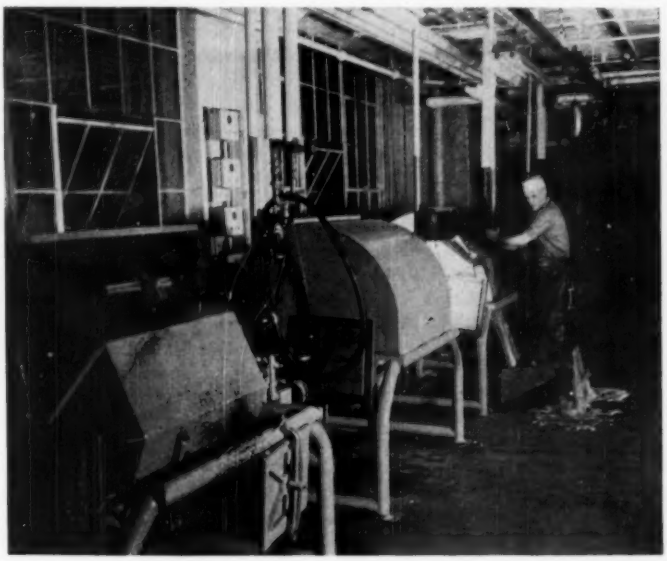


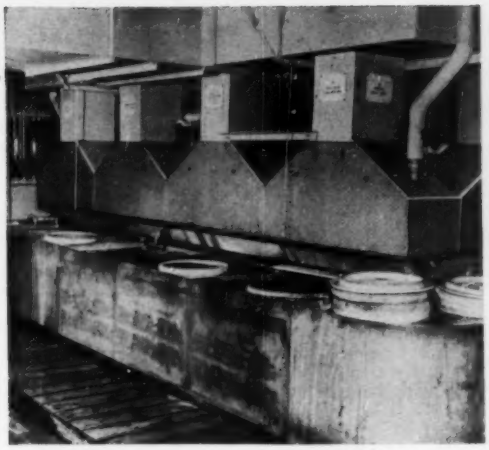
Four-hundred-ton press in which the cap of the three-piece razor is formed from round stock in one blow.

This press, one of a line of presses in the Stamping Department, performs another typical press operation. Note Lucite safety guards, magazine feed, etc., which assure clean and safe working conditions.

The Tumbling Department has a number of features: tile floor; automatic interval timers; low-voltage safety switches requiring use of both hands to rotate barrel when cover is up; air-hoist hose reel on trolley instead of in center of room, permitting two hoists on one enclosed monorail loop. Swivel joint in air line allows continuous travel in the same direction without tangling.





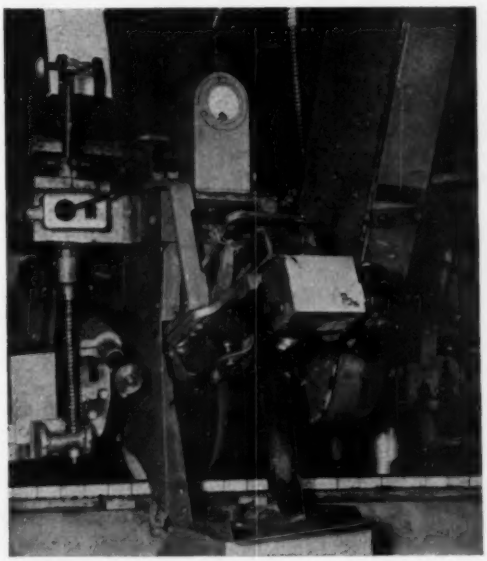


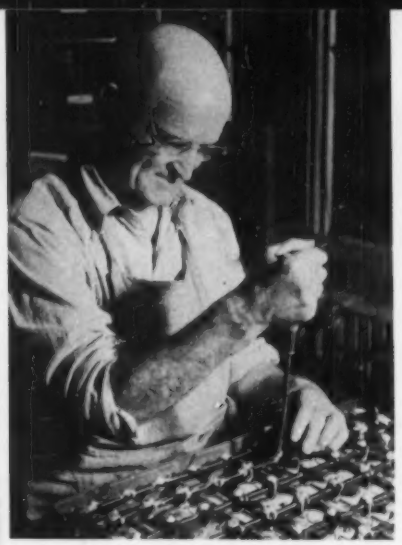
In the bright-dipping installation, with acid crocks immersed in rinse tanks, two 10,000-cfm blowers are interconnected to the exhaust-duct system to remove acid fumes and assure good working conditions.

In the Buffing Department all but the more complex shapes are processed on automatics. Here a rotary indexing automatic buffing machine turns out 1200 handles per hour.

This straight-line automatic machine buffs 3000 razor caps per hour. It has such refinements as electric composition applicators, safety limit switches, continuous spray cleaning of conveyor-chain fixtures, floating heads with ammeters for control of buff pressure, etc.

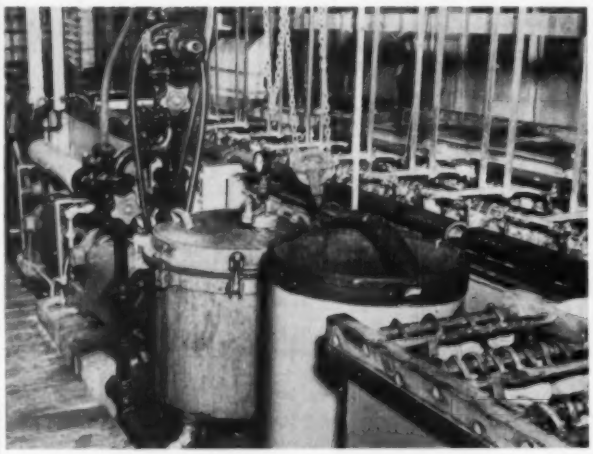
Hand buffing operation. Note wheel-hood design, with adjustable baffle at top hinging from pin near back and protecting the operator from loose dirt. Illumination in the Buffing Department runs from 50 to 100 foot-candles to provide ample light so essential for the production of surface finishes which surpass that on most jewelry.





Stenciling the trade mark on the three-piece razor cap (see also front cover). Like buffing inspection and sub-assembly, this operation is combined with racking for plating and performed on the Buffing Department floor, all to reduce handling. The racked work is carried by conveyor to the Plating Room.

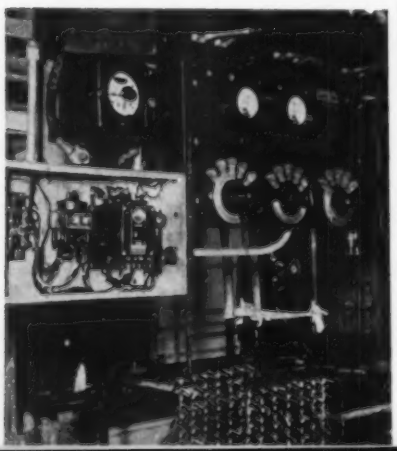
Plating racks are designed for maximum efficiency and uniformity of plate distribution. The latter is important because cost of gold anodes runs to $250,000 per year. Here a rack repairman is tightening work holders. He checks all contacts individually with an ohmmeter for uniform current distribution.



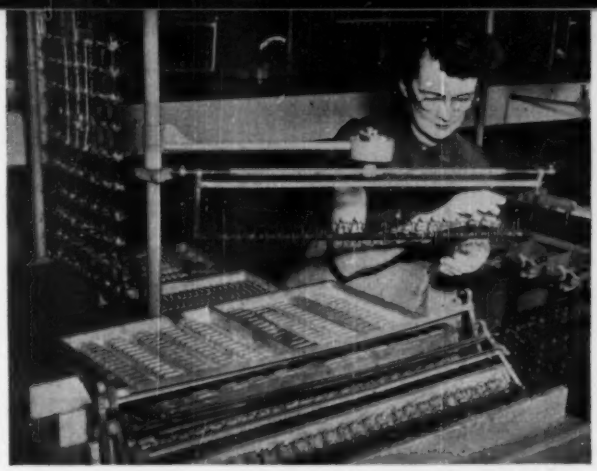
The automatic machine for nickel and gold plating has an hourly capacity of 160 racks averaging 100 pieces per rack. The cycle, for which baths of proprietary composition are largely used, comprises: (1) agitated soak cleaning; (2) cathodic and anodic cleaning; (3) mild acid dip; (4) 9-minute bright-nickel plate; (5) cyanide activation; (6) 30–75-second gold plate; and requisite rinses and dryer. This picture shows in front of the machine, from left to right, the heating, pumping, filtering, and electrolytic purification system for the bright-nickel solution. A separate small rectifier supplies the purification current.

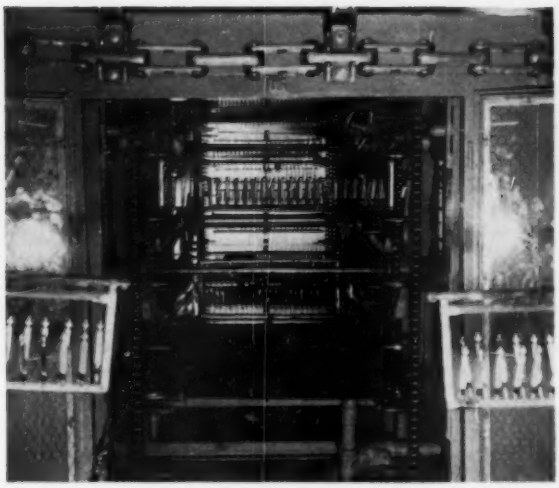
The gold plating bath in the automatic, one of the largest in use, is a modification of a standard 24K gold formula, which provides a wide current-density bright-plate range and bright deposits up to 20 millions of an inch.

The main switchboard is placed in a rectifier penthouse on the roof over the plating room. This location makes for short bus-bar leads to tanks, thus minimizing voltage drop.



Reracking of gold plated parts to special lacquer-dip racks makes use of two conveyors, one for lacquering racks and one for plating racks, run one above the other beside the operator. Whenever practicable, unracking after plating, as well as after lacquering, is combined with inspection and partial assembly to reduce handling.





The fullautomatic "lacquer" dipping-baking machine makes use of a clear phenolic baking material, especially compounded for the high soap resistance required by the end use of the product. Lacquer viscosity, oven temperature, and time are all controlled to assure optimum results, and continuous filtration of the lacquer is provided.

The one-piece razor-assembly, inspection, and packing conveyor belt carries the packed sets to finish stock. Note how as a safety measure operators in foreground must depress simultaneously both hand valves at table's edge to actuate presses.

A trained laboratory staff, with the help of specialists from the Quality Division, control plating-solution composition and operating conditions, as well as deposit thickness, appearance and physical properties. As shown in the background, the laboratory is adjacent the plating room to provide rapid servicing.

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N. THON*

associates:

LING YANG*
DENIS KELEMEN*

location:

FRICK CHEMICAL LABORATORY

PRINCETON UNIVERSITY,
PRINCETON, N. J.

Acknowledgment is due the Research Committee, Dr. Louis Weisberg, Consulting Chemist, New York City, Chairman; the Research Directing Committee, Mr. William M. Tucker, Eastman Kodak Company and Dr. W. A. Wesley, The International Nickel Company, Chairman and Vice-Chairman, respectively; and the Project Committee, Dr. W. A. Wesley, Chairman; Dr. B. Egeberg, International Silver Company, and Mr. A. Mendizza, Bell Telephone Laboratories, Inc., for their contributions to this project.

*AUTHORS

Porosity of Electrodeposited Metals

VII. RATES OF CORROSION OF PROTECTIVELY PLATED IRON FOILS

In previous communications in this series[1], it has been shown how the gas permeability method can be put to use for accurate and objective measurement of the rate at which a metal foil corrodes when exposed to a certain corrosive medium. The progress of the corrosion, at an early stage when no visible or ponderable changes can yet be detected, manifests itself in a systematic increase of the permeability constant k. Eventually, a visible failure will appear, but the rate-of-corrosion curves, in the form of plots of k against the time of exposure, permit safe evaluation of the relative resistances to the given corrosive medium long before any visible failure has appeared.

This method has now been applied to the evaluation of the protective value of different electrodeposited coatings commonly used for the protection of iron.

As corrosive medium we have chosen, in this investigation, hot (95° C; 203° F) distilled water of *p*H 5.4. Hot water has been variously used as "porosity reagent", under the tacit but wrong assumption that it only "reveals" existing pores in a coating on iron. It has been shown by Wesley and Knapp[2] that low-*p*H distilled water produces perforations in nickel foils. By the much finer gas-permeability method, we could show that this applies to water of *p*H 6.0 as well, the permeability of a nickel foil increasing systematically with the length of the treatment by hot water. Hot water of *p*H 5.4 is a very suitable corrodent, easy to use, clean, reproducible, and conveniently fast.

In a preliminary way, we have ascertained the effects of chromium coatings of different thicknesses on the corrodibility of nickel, specifically electrolytic Watts nickel foils of 25-micron (1-mil) thickness, showing no initial permeability. These foils were tested, in hot water, uncoated and with 2, 4, and 14 microns (about 0.08, 0.16, and 0.55 mil) thick chromium coatings on both sides*. The results are given in Table I.

That too thick chromium coatings, far from improving the corrosion resistance, only impair it, has been well known all along. With a chromium coating of purposely exaggerated thickness, 14 microns, not only did the nickel foil become unusually corrodible but it even has ac-

TABLE I. EFFECT OF EXPOSURE TO HOT DISTILLED WATER ON THE PERMEABILITY CONSTANT k OF CHROMIUM PLATED NICKEL FOIL

Distilled water: 95° C, *p*H 5.4
Nickel foil: 25 micron thick, from Watts bath

Chromium Coating Thickness* microns	10^4k (liter/cm² min.) hours of exposure			
	0	6	10	20
0	0	1.5	1.8	9.2
2	0	1.0	1.5	3.2
4	0	0.8	1.2	3.0
14	1.0	5.0	200	...

*On each side of foil.

*The reader should note that even the thinnest chromium deposit tested (2 microns, 0.08 mil) is eight times thicker than the minimum specified in A. S. T. M.–A. E. S. and other specifications.

Reference is made to the findings of S. G. Clarke, reported in J. Electrodepositors' Tech. Soc. 15, 147 (1939), that irrespective of the thickness of chromium, 0.01–0.1 mil, deposited on a pure nickel foil, a greenish corrosion developed in the early stages of exposure to the outdoor atmosphere in Woolwich, England.—Editor.

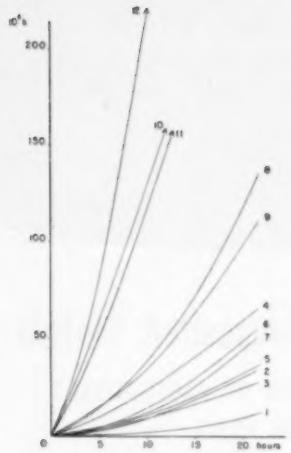

Fig. 1. Effect of exposure of copper, nickel and chromium plated electrolytic iron foil to hot distilled water. For data, see Table II

TABLE II. EFFECT OF EXPOSURE TO HOT DISTILLED WATER ON THE PERMEABILITY CONSTANT k OF COPPER, NICKEL, AND CHROMIUM PLATED ELECTROLYTIC IRON FOIL

Distilled Water: 95° C, *p*H 5.4
Iron foil: 40 microns thick

Sample No.	Coating*				10^5k (liter/cm²-min)			
	Copper microns	Nickel		Chromium microns	hours of exposure			
		kind	microns		0	5	10	20
1	2	W†	12	2	0	0.00	0.30	1.0
2	2	W	6	2	0	0.20	1.0	3.2
3	..	W	12	2	0	0.50	1.2	2.6
4	..	W	6	2	0	0.90	3.0	5.5
5	..	B‡	12	2	0	0.60	1.1	3.3
6	..	B	6	2	0	0.90	2.5	5.0
7	2	W	12	..	0	0.71	1.2	4.6
8	2	W	6	..	0	1.6	4.0	12
9	..	W	12	..	0	2.0	3.4	10
10	..	W	6	..	0	6.0	13	40
11	..	B	12	..	0	5.0	12	30
12	..	B	6	..	0	8.3	22	53

*On each side of foil. †From Watts bath. ‡Brightened deposit.

quired a measurable *initial* permeability With a thin chromium coating there is a definite, but on the whole very small improvement of the corrosion resistance of nickel *alone*. The advantage of doubling the thickness of the chromium from 2 to 4 microns (0.08 to 0.16 inch) is practically nonexistent.

For the subsequent experiments with coated iron foils we chose, for the thickness of the chromium coatings, 2 microns, that having proved to be the thickness of coating tested which has but little effect on the corrodibility of nickel.

The base metal, in all these experiments, was 40 microns (1.6 mil) thick electrolytic iron foil, produced from a warm ferrous chloride bath on electrolytic copper and separated from it by dissolution in potassium cyanide. The foils were coated on *both* sides with the deposits listed in Table II. The *copper* deposits, 2 microns thick, were made from a cyanide bath; *nickel* (W), from a regular Watts bath; nickel (B), from the same bath with 1 per cent nickel metabenzene disulfonate added. Conditions of the electrodeposition were as described in our previous communications.

Results of determinations of k on exposure are given in Table II and in Fig. 1. The graph speaks for itself. The results claim no novelty, but they do illustrate the quantitative assurance of which the method is capable. That 12 microns (0.47 mil) of nickel protect better than 6 microns (0.24 mil) is, of course, trivial. The pronounced protective effect of a thin chromium deposit over nickel on iron, while certainly not novel, is of interest in the face of the fact that this effect is distinctly operative in the combinations iron-nickel-chromium and iron-copper-nickel-chromium but hardly on nickel alone; in other words, chromium as top layer of the "sandwich" does not protect through its protective action on nickel, but the protective effect is a ternary affair†, in agreement with the point of view recently put forward by Uhlig.[3] The lesser protection afforded by brightened nickel as compared with dull Watts nickel of the same thickness is in accord with our previous findings (to be reported later in this series) with regard to the greater corrodibility of organically brightened nickel deposits. This, incidentally, leads to the conclusion that, as many have surmised, corrosion of iron through protective coatings is the result of the *corrodibility* of the coating, not of its "porosity" in the old sense. Significantly, addition of a chromium layer on top of the nickel tends to annul the difference between brightened and dull nickel.

The controversial issue of the benefit from an undercoat of copper is resolved in the positive sense in the particular instance of our samples, that is, with a 2-micron copper layer on *electrolytic* iron. Whether this will hold for other relative thicknesses, and particularly on rolled iron, will be decided by further experiments. The distinctive feature of relative rate-of-corrosion determinations by the gas permeability method is their objective unambiguousness, owing to which safe conclusions can be drawn from single experiments. This contrasts with the notorious uncertainty of conclusions from conventional criteria of the degree of corrosion. By those criteria an accepted conclusion can be reached only by the consensus of innumerable tests. Even so, the interpretation and rating in conventional corrosion tests—being what they are, evaluations of relative corrodibilities—remain, more often than not, debatable. The gas permeability method is clearly indicated to resolve such controversial issues.

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†Simple calculation will show that the addition of 2 microns (0.08 mil) of chromium in Table I increases the permeability constant k of the nickel foil an average of 90 per cent during the 20-hour exposure and 190 per cent at the end of 20 hours. Similar calculations for the nickel plated and copper-nickel plated iron foils in Table II show an average increase of about 400 per cent throughout the 20-hour runs.

The reader's attention is directed to the report by Blum and Strausser, in J. Research Natl. Bur. Stds. **24**, 459, 465, 472 (1940), RP 1993, to the effect that an increase in chromium thickness from 0.5 micron (0.02 mil) to 2.5 micron (0.1 mil) increased the outdoor-exposure ratings of nickel plated low-carbon steel (as well as of copper-nickel plated zinc-base diecastings, but not of nickel plated brass).—EDITOR.

Low Cost Finishing

(*Continued from page 617*)

become small enough to be objectionable, the loss in mass due to wear must be made up.

Separation of Parts

Separation of finished parts from processing media is sometimes troublesome. Ferrous parts may be separated magnetically from nonmagnetic processing materials, but nonferrous materials must be separated by screening parts from media or *vice versa*. Whenever possible, parts should be processed in chips which are smaller than the parts so that separation can be easily made.

After separation, the processed parts must be dried or treated to prevent rusting or tarnishing until subsequent operations can be performed. There are numerous ways of drying parts which are quite common in the finishing field and which find a suitable application here. Rustproofing of iron and steel parts requires only a dip in the proper rust preventive to provide the desired protection.

Special Applications

Many special applications of Roto-Finish have been proven useful. Notable results have been obtained in improving fatigue resistance and in stress relieving of heat-treated spring-like parts, as well as thin high-carbon-steel items produced by blanking operations. Another instance of outstanding success is in removal of excess paint or lacquer from around the filled letters on small plastic knobs and dials. In general, the process is utilized most effectively when it is treated as a distinct manufacturing process, integrated into the general manufacturing procedure for the finished item.

Limitations

Roto-Finish, like every other industrial process, has its limitations. It does not in all instances produce a finish equal or comparable to a finish developed by manual means. Parts having relatively large flat surfaces and sharp corners or edges are not as easily processed to a smooth lustrous finish as similar parts having curved surfaces and rounded corners and edges. Recessed areas are not finished as well as exposed areas. Heavy burrs, or even light burrs, in inaccessible locations cannot be removed without considerable difficulty.

Conclusion

Only the fundamental features of Roto-Finish have been presented in this article. There are numerous details which are only learned by constant used of the equipment, processes, and materials. The systematic application of this practical knowledge to new problems will produce greater benefits in the form of more production and better results at a lower cost.

Electrodeposited Coatings

Continued from page 624)

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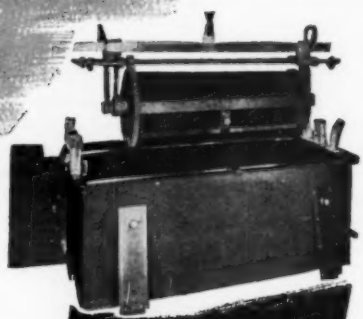

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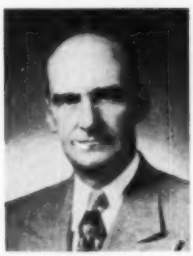

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The central purpose is professional. The Editorial Board has set up a superb EDUCATION program . . . we hope to provide a background and atmosphere worthy of its excellence.

Second . . . in three long centuries there have grown up in this town some unique institutions—historical, cultural and gastronomical. From among these we have for your PLEASURE sought items native to our hills and our history, the products of our salty tides and saltier traditions, hoping you will take home on your palates and in your memories some flavors uniquely Boston.

But we well know too that you come here answering the calls of FRIENDSHIP. Our best service is to open our city for the renewal of the old warm associations and the discovery of new congenial spirits . . . of whatever sort. For thus are forged the bands that hold the A. E. S. together.

Pray with us for sunny skies . . . bear with us in our deficiencies . . . and call on us frequently and freely when we can in any way prove to you how glad we are you have come.

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Convention Committee

GENERAL PROGRAM

Eastern Daylight Saving Time Used Throughout

Abstracts of papers listed below are found on pages 643–647

SUNDAY, JUNE 11, 1950

4:00 P. M. to 8:00 P. M.

REGISTRATION, Mezzanine, Hotel Statler. The Registration Fee of $10.00 entitles registrant to a book of tickets admitting to certain Convention functions and activities listed in program.

MONDAY, JUNE 12, 1950

8:00 A. M.

REGISTRATION, Mezzanine, Hotel Statler.

9:30 A. M. to 12:00 Noon

OPENING SESSION, Georgian Room, Hotel Statler.

Invocation: The Reverend Frank C. Mesle, Rochester Branch.

Welcome to Boston: The Honorable John B. Hynes, Mayor of Boston.

Welcome to Electrodepositors' Technical Society: Arthur W. Logozzo, President, A. E. S.

Testimonial to Founder Members: Dr. George P. Swift, Secretary, Boston Branch.

Greetings from Boston Branch: Louis V. Gagnon, President.

Address: Daniel Gray, Chief Chemist, Oneida, Ltd.

First Business Session: Arthur W. Logozzo, President, A. E. S., presiding.

9:30 A. M. to 2:00 P. M.

NATIONAL ASSOCIATION OF METAL FINISHERS, Board of Directors Meeting and Luncheon, Parlor F, Hotel Statler.

12:00 Noon

EDUCATION COMMITTEE LUNCHEON, Terrace Room, Hotel Statler.

12:15 P. M.

INTERNATIONAL FELLOWSHIP CLUB, 26th Annual Luncheon, Ball Room Foyer, Hotel Statler. For suppliers and their representatives only.

2:00 P. M. to 4:30 P. M.

FIRST EDUCATIONAL SESSION, Georgian Room, Hotel Statler.

General Subjects

Chairman: Mr. Leonard E. Weeg, National Lock Company, Rockford, Ill.

1. "*The Self-regulating High Speed Chromium Plating Bath*", by Dr. J. E. Stareck, A. Mahlstedt, and F. Passal, United Chromium, Inc., Detroit, Mich.
2. "*The Nodule Method of Measuring Adhesion of Electrodeposited Coatings*", by Dr. A. Brenner and V. D. Morgan, National Bureau of Standards, Washington, D. C.
3. "*Advances in Electrodeposition in the Graphic Arts*", by E. I. Peters, Pontiac Engraving & Electrotype Company, Chicago, Ill.
4. "*High Speed Nickel Plating of Curved Stereotypes*", by K. L. Koessler and R. R. Sloan, Buffalo, N. Y.
5. "*Electroplating and Metal Finishing Developments in Germany, 1940-1950*", by Dr. R. Springer, Spezialwerk fuer Galvanotechnik Leipzig, Leipzig, Germany.

8:30 P. M. to 1:00 A. M.

OPEN HOUSE, Imperial Ball Room Suite, Hotel Statler. Auspices of the International Fellowship Club.

Music — Dancing — Buffet served at 10:00 P. M.

A ticket to this event is included in the Convention book.

TUESDAY, JUNE 13, 1950

7:45 A. M.

EDUCATION COMMITTEE BREAKFAST, Cafe Rouge, Hotel Statler.

8:00 A. M.

REGISTRATION, Mezzanine, Hotel Statler.

9:00 A. M. to 11:30 A. M.

SECOND EDUCATIONAL SESSION, Georgian Room, Hotel Statler.

Smoothing and Leveling of Electrodeposits, Part I

Co-Chairmen: Mr. Myron B. Diggin, Hanson-Van Winkle-Munning Company, Matawan, N. J., and Dr. George P. Swift, Consultant, Watertertown, Mass.

1. "*Measurement of Surface Smoothness*", by Dr. H. J. Kellner, Lea Manufacturing Company, Waterbury, Conn.
2. "*The Measurement of Surface Roughness with the Interference Microscope*," by A. G. Strang and F. Ogburn, National Bureau of Standards, Washington, D. C.
3. "*Smoothing by Chemical and Electrochemical Polishing*", by Dr. C. L. Faust, Battelle Memorial Institute, Columbus, Ohio.
4. "*Leveling with PR Current Plating*", by George W. Jernstedt, Westinghouse Electric Corporation, East Pittsburgh, Pa.
5. "*Some Observations of the Microthrowing Power of Plating Solutions*", by C. E. Reinhard, New Jersey Zinc Company, Palmerton, Pa.

12:00 Noon

ELECTRODEPOSITORS' TECHNICAL SOCIETY LUNCHEON, Salle Moderne, Hotel Statler.

NATIONAL ASSOCIATION OF METAL FINISHERS, Job Platers' Luncheon, Parlor C, Hotel Statler.

EDUCATION COMMITTEE LUNCHEON, Terrace Room, Hotel Statler.

2:00 P. M. to 4:30 P. M.

THIRD EDUCATIONAL SESSION, Georgian Room, Hotel Statler.

Smoothing and Leveling of Electrodeposits, Part II

Co-Chairmen: Mr. Myron B. Diggin, Hanson-Van Winkle-Munning Company, Matawan, N. J., and Dr. George P. Swift, Consultant, Watertown, Mass.

5. "*Leveling in Cobalt-Nickel Plating Solutions*", by Dr. L. Weisberg, Consultant, New York City.
6. "*Surface Contour and Leveling*", by A. H. DuRose, W. P. Karash and Dr. K. S. Willson, The Harshaw Chemical Company, Cleveland, Ohio.
7. *General Discussion of Leveling*

8:00 P. M.

ELECTROPLATERS' NIGHT AT THE BOSTON POPS, Symphony Hall, Huntington Avenue.

A ticket in the Convention book may be exchanged for a ticket to this event at the Registration desk any time Tuesday between 10:30 A. M. and 7:00 P. M.

WEDNESDAY, JUNE 14, 1950

7:45 A. M.

BRANCH SECRETARIES' BREAKFAST, Parlor C, Hotel Statler.

EDUCATION COMMITTEE BREAKFAST, Cafe Rouge, Hotel Statler.

8:00 A. M.

REGISTRATION, Mezzanine, Hotel Statler.

9:00 A. M. to 11:30 A. M.

FOURTH EDUCATIONAL SESSION, Georgian Room, Hotel Statler.

Mechanical Finishing

Chairman: Mr. Walter L. Pinner, Houdaille-Hershey Corporation, Detroit, Mich.

1. "*Metal Finishing by Abrasive Tumbling*", by H. M. Goldman, Enthone, Inc., New Haven, Conn.
2. "*Abrasive Belt Polishing*", by E. E. Outhout, Behr-Manning Corporation, Troy, N. Y.
3. "*Flat Polished Phosphate Coated Steel Reduces Polishing Cost*", by H. J. McVey and V. M. Darsey, Parker Rust Proof Company, Detroit, Mich.
4. "*Water Base Buffing Liquid*", by E. T. Candee and S. L. Doughty, Jr., The Lea Manufacturing Company, Waterbury, Conn.

12:00 Noon

INTERNATIONAL FELLOWSHIP CLUB GOLF TOURNAMENT, Tedesco Country Club, Swampscott, Mass.

Chairman: Mr. Joseph J. Duffy, Jr., Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.

Prizes will be awarded; all handicap groups have a chance to win.
Bring your clubs and shoes!
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1:30 P. M. to 6:30 P. M.

OUTING AND CLAMBAKE, Thomson Club, Nahant Beach, Nahant, Mass. Buses leave Statler from Columbus Avenue door.

Softball: East (Champions) vs. West.

Clambake at 5:00 P. M.
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2:00 P. M. to 4:00 P. M.

RESEARCH COMMITTEE MEETING, Parlor D, Hotel Statler.

6:00 P. M.

RESEARCH COMMITTEE DINNER, Parlor D, Hotel Statler.

THURSDAY, JUNE 15, 1950

8:00 A. M.

REGISTRATION, Mezzanine, Hotel Statler.

COMBINED BREAKFAST, RESEARCH AND EDUCATION COMMITTEES, Parlor C, Hotel Statler.

9:00 A. M. to 11:30 A. M.

FIFTH EDUCATIONAL SESSION, Georgian Room, Hotel Statler.

Research Reports
Chairman: Mr. B. C. Case, Hanson-Van Winkle-Munning Company, Detroit, Mich.

1. "*The Reporting and Use of Research Data*", by G. M. Cole, Ternstedt Division, General Motors Corporation, Detroit, Mich.
2. "*Why Pay for Porosity Research?*" by Dr. W. A. Wesley, The International Nickel Company, Bayonne, N. J.
3. "*Use of Radioactive Isotopes for Determination of Current Distribution*", by Dr. John Kronsbein, Evansville College, Evansville, Ind.

2:00 P. M.

FINAL BUSINESS SESSION, Georgian Room, Hotel Statler.

7:00 P. M. to 1:00 A. M.

ANNUAL BANQUET, Imperial Ball Room Suite, Hotel Statler.
Dinner — Golf Prizes — Awards — Entertainment — Music — Dancing.
A ticket to this event is included in the Convention book.

GREETINGS, LADIES!

IT IS with a great deal of pleasure that we again welcome you, Ladies, to Boston. It was nine years ago that we gathered here. Long remembered is the good fellowship that prevailed!

Knowing that your time is limited and that Boston is rich in tradition, we have arranged a program that will cover some of the more important attractions of our fair city.

One of the outstanding events which proved so successful in the 1941 National Convention was the "Pops Concert" by the Boston Symphony Orchestra. This year, by popular demand, the men will enjoy the concert as well as the women.

A novel item on this year's program is the educational session on Electroplating prepared especially for us, which will also include a demonstration of plating. The two-fold purpose of this session is to acquaint us girls with the work the men are doing and to show us what to look for when we buy plated items.

Once again there is a tour of Historic Boston, with a generous stop-over at the Botanical Museum of Harvard University, where you will see the world-famous collection of flowers fashioned in glass. Nowhere else in the world will be found such a wonderful collection.

The other events that have been planned for your enjoyment will be found in the official program. We urge you to take special note of date, time, and meeting place or starting point, so that the program will go along smoothly and disappointments will be few.

While the official program will keep you quite busy, you will still have free moments to be on your own for such things as shopping, a visit to the hairdresser, and time to look up your long-lost relatives, or friends that you met at previous conventions.

If you have any special problems, do not hesitate to get in touch with me or anyone on my committee. We are anxious to meet you and to help make your stay pleasant. Enjoy yourself in Boston!

Your LADIES' COMMITTEE,

Ann Baker Love, Chairman

LADIES' PROGRAM

Eastern Daylight Saving Time Used Throughout

SUNDAY, JUNE 11, 1950

4:00 P. M. to 8:00 P. M.

REGISTRATION, Mezzanine, HOTEL Statler. The Registration Fee of $10.00 entitles registrant to a book of tickets admitting to certain Convention functions and activities listed in program

MONDAY, JUNE 12, 1950

8:00 A. M.

REGISTRATION, Mezzanine, Hotel Statler.

12:30 P. M. to 1:30 P. M.

Parlor C, Hotel Statler.
Ladies will meet for an informal "get-acquainted" gathering before leaving for the tour of Boston.

1:00 P. M. to 5:00 P. M.

SIGHT-SEEING TOUR, historic Boston, Cambridge, Harvard University.
Buses leave Hotel Statler from Columbus Avenue door.

8:30 P. M. to 1:00 A. M.

OPEN HOUSE, Imperial Ball Room Suite, Hotel Statler. Auspices of the International Fellowship Club.
Music — Dancing — Buffet served at 10:00 P. M.
A ticket is includedin Convention Book.

TUESDAY, JUNE 13, 1950

8:00 A. M.

REGISTRATION, Mezzanine, Hotel Statler.

12:30 P. M.

GUIDED TOUR AND TEA, The Wayside Inn, Sudbury, Mass. Auspices of M. E. Baker Company.
Buses leave Hotel Statler from Columbus Avenue door.

Ticket to this event is included in the Convention book.

This is the good old Inn made famous by Longfellow's "Tales", carefully restored to its condition of the Longfellow period by Henry Ford. The little red schoolhouse in the neighborhood, the grist mill where corn meal is actually ground for sale, the whole vicinity are now a faithful representation of what the Inn looked like at the time the famous poem, "Paul Revere's Ride" was written.

8:00 P. M.

ELECTROPLATERS' NIGHT AT THE BOSTON POPS, Symphony Hall, Huntington Avenue.
A ticket in the Convention book may be exchanged for a ticket to this event at the Registration Desk at any time Tuesday between 10:30 A. M. and 7:00 P. M.

WEDNESDAY, JUNE 14, 1950

8:00 A. M.

REGISTRATION, Mezzanine, Hotel Statler.

10:00 A. M. to 11:30 A. M.

EDUCATIONAL SESSION AND PLATING DEMONSTRATION, Salle Moderne, Hotel Statler.
Chairman: Louis V. Gagnon, President, Boston Branch.

Principal Speaker: Myron B. Diggin, Hanson-Van Winkle-Munning Co., Matawan, N. J.
Movie: Jewelry Plating
Plating Demonstration: Henry Strow, MacDermid, Inc., Waterbury, Conn.

1:30 P. M. to 6:30 P. M.

OUTING AND CLAMBAKE, Thomson Club, Nahant Beach, Nahant, Mass.
Buses leave Hotel Statler from Columbus Avenue door.
International Fellowship Club's "Plato" Party, under the direction of Joan Trumbour Wiarda—with prizes!
Clambake at 5:00 P. M.
Wear your outing clothes!
A ticket to this event is included in the Convention book.

THURSDAY, JUNE 15, 1950

8:00 A. M.

REGISTRATION, Mezzanine, Hotel Statler.

12:30 P. M.

AUNT ELLA'S SOCIETY LUNCHEON PARTY, Vienna Room, Steuben Restaurant, 114 Boylston Street. Sponsored by Oakite Products, Inc., David X. Clarin, Secretary.
A ticket to this event is included in the Convention book.

7:00 P. M. to 1:00 A. M.

ANNUAL BANQUET, Imperial Ball Room Suite, Hotel Statler.
Dinner — Awards — Music — Entertainment—Dancing.
A ticket is included in Convention book.

ABSTRACTS OF CONVENTION PAPERS

THE SELF-REGULATING HIGH SPEED CHROMIUM PLATING BATH, *by J. E. Stareck, H. Mahlstedt and F. Passal.*

The operating characteristics of a new chromium plating solution are compared with those of the conventional chromic acid-sulfate solution. The principle of automatic regulation of the catalyst content is discussed. Graphs, data, photomicrographs, profilometer records, and photographs serve to compare the following characteristics of the two solutions and the deposits produced in them over a wide range of plating conditions: current efficiencies and plating speeds; scratch hardness, microscopic appearance, and smoothness of deposits; and coverage of nickel plated production pieces. The effect of these characteristics in commercial production is shown.

METHOD OF MEASURING THE ADHESION OF ELECTRODEPOSITED COATINGS, *by Abner Brenner and Virginia Dare Morgan.*

A method of measuring the adhesion of electrodeposited coatings of commercial thicknesses has been developed. It involves the electroforming on the surface of the coating of a mushroom-shaped projection, or nodule, of cobalt which serves as a grip for detaching the coating. The nodule is detached with a simple device, consisting of a chuck and a strong spring, and the force of detachment, or adhesion, is measured in pounds per square inch. In practically all cases the coating is detached with the nodule. The electroformed nodule is about 1/16 inch in diameter and about 1/32 inch high. Three to four hours are required for the formation of the nodule, and the complete test on a specimen can be made during one workday. The method is probably useful for laboratory examination of specimens, but not as a rapid outline method for plant control.

ADVANCES IN ELECTRODEPOSITION IN THE GRAPHIC ARTS, *by E. I. Peters.*

Various graphic arts are defined, and the role of electroplating is given for each. A number of technological advances are then described, including chromium plating and nickel plating (in the nickel chloride-acetate bath) of stereotypes; use of the cobalt-nickel solution in electrotyping; tin plating of electrotype shells; use of the copper fluoborate bath in electrotyping and rotogravure-cylinder plating; iron deposition in electrotyping and manufacture of engraving plates; and zinc plating of deep-etch offset lithographic plates.

HIGH SPEED NICKEL PLATING OF CURVED STEREOTYPES, *by Kenneth L. Koessler and Robert R. Sloan.*

A report is presented on the applicability of a nickel fluoborate solution, containing about 7.5 oz/gal nickel and 2 oz/gal free boric acid, to the plating of stereotypes. A 700-gallon tank was run in production for 60 days. During this time one-half of the stereotype plating was carried out in the fluoborate bath, and at the end a complete change to fluoborate was made because of ease of control, high plating speed (0.0005 inch in 7.5 minutes), economy of heating, high anode and cathode efficiencies, stability of *p*H, cleanliness and absence of odor in operation, low power and chemical cost, substantial absence and ease of control of pitting. Details of the preparatory cycle are given.

ABSTRACTS OF CONVENTION PAPERS

Electroplating and Metal Finishing Developments in Germany, 1940–1950, *by Richard Springer.*

The paper covers the war time and the time after the war. It describes developments in cleaning and pickling; deposition of nickel, chromium, zinc, silver, gold, and iron; oxidation of aluminum, magnesium, iron, and alloys of these metals; phosphatizing; methods of examining coatings; and in other fields.

Measurement of Surface Smoothness, *by H. L. Kellner.*

This introductory paper is written to eliminate duplication of description of measuring techniques in the papers that follow. The methods described include: (1) microscopic methods (a) for surface examination by perpendicular viewing with oblique lighting parallel to and perpendicular to scratches, and by oblique viewing with lighting perpendicular to surface, and (b) for examination of cut edge mounted in plastic, ground, polished, and etched by usual metallographic procedure, either perpendicularly or at an angle to the surface; (2) tracer methods by the Brush Analyzer and the Profilometer, and comparison of results obtained; and (3) the replica method, both comparison of replicas with Fax Film equipment and evaluation of replicas by Herschman apparatus.

Measurement of Surface Roughness with the Interference Microscope, *by Arthur C. Strang and Fielding Ogburn.*

The Zeiss interference microscope which combines into one instrument the microscope and the interferometer can be used to study and measure the smoothness of electrodeposited surfaces. With this instrument, the height and depth of surface imperfections, such as fine scratches or microscopic nodules and pits, can be measured over the range of 2–80 microinches. The surface can be inspected with a magnification of 664X and can be scanned as with a microscope. Photographic records can be made of small areas about 0.009 inch in diameter. No special preparation of the surface being examined is required.

Leveling and Smoothing by Electropolishing and Chemical Polishing, *by C. L. Faust.*

Data are supplied on the microroughness as revealed by Profilometer, Brush Surface Analyzer, and reflectivity measurements, as well as microscopic examination, before and after electropolishing and chemical polishing of steel, brass, and aluminum base metals and before and after chemical and electrobuffing of nickel plate. The value of these treatments in providing adhesion of electrodeposits is also shown.

Leveling with PR Current Plating, *by G. W. Jernstedt.*

Mechanical, chemical, and electrochemical methods of leveling are reviewed. The fundamental factors affecting leveling with PR plating, such as PR cycle, current density, thickness of deposit, agitation, solution composition, addition agent, and contamination, are described. Particular consideration is given to the elimination of buffing in the appliance and automotive fields by polishing the base metal in the flat and by providing increased leveling in the plating bath. The effect of leveling with the PR process on orange peel resulting from drawing operations is set forth. The leveling possible with heavy deposits, such as the 0.040 inch thick stamper employed in the record industry, is also described.

Some Observations of the Microthrowing Power of Plating Solutions, *by C. E. Reinhard.*

In an earlier study of plated metal-powder compacts it was found that the de-

posits extended into surface and subsurface voids, sometimes into labyrinths several thousandths of an inch deep. There appeared to be marked differences in the extent to which this occurred with different plating solutions. Illustrations of these deposits are shown. A series of tests is then described which was performed in an attempt to establish the factors controlling microthrowing power by means of systematic variations of plating conditions in several nickel solutions. Specimens with specially prepared grooves of a size corresponding to some of the surface voids in compacts were used. A complete explanation has not been derived, but the effects of several variables are shown. Photomicrographs of deposits made on the standardized grooves are presented. They include copper, nickel, zinc, and chromium coatings on brass and a few of these deposits on copper, steel, and silver basis metals.

LEVELING IN COBALT-NICKEL PLATING SOLUTIONS, *by Louis Weisberg.*

Composition and operating details of cobalt-nickel plating solutions with leveling properties are described. Bright or semibright deposits with substantially the same degree of leveling may be obtained. Good leveling is favored by high temperature, vigorous agitation, and high metal content. Nickel chloride over about eight ounces per gallon is detrimental, as are also various metallic and organic impurities and ammonium compounds. Formic acid accounts for the main leveling effect. Formaldehyde is used to obtain brightness but does not affect leveling. Physical properties and corrosion resistance are substantially the same as those of cobalt-nickel deposits from solutions in general use.

SURFACE CONTOUR AND LEVELING, *by A. H. Du Rose, W. P. Karash and K. S. Willson.*

Methods and meaning of measurements used in the tests reported in this paper are briefly reviewed. Leveling due to inherent properties of a bath is treated, with consideration of mathematical and geometric approaches, including atomic-force characteristics. Relationship between thickness of the deposit and leveling for various solutions is discussed. Results are given to demonstrate methods for evaluating the relative contribution of "flowing" and "cutting off" of metal in the buffing process. The effect of surface texture and hardness on ease of buffing is discussed briefly. The lack of fundamental information is pointed out.

METAL FINISHING BY ABRASIVE TUMBLING, *by Hubert M. Goldman.*

Theoretical and practical information is presented on tumbling techniques involving the use of abrasives where actual cutting down of metallic surfaces is desired.

L. E. WEEG, *Session Chairman,* J. E. STARECK, H. MAHLSTEDT, F. PASSAL, A. BRENNER.

V. D. MORGAN, E. I. PETERS, R. SPRINGER; M. B. DIGGIN and G. P. SWIFT, *Sessions Co-Chairmen*

ABSTRACTS OF CONVENTION PAPERS

Production and experimental operations are specifically described. Theoretical aspects noted have been carefully checked as to practicability. Burnishing practices are not included unless they automatically accompany truly abrasive operations. Data are presented on the use of artificial and natural abrasives as media and on nonabrasive media which do not fall within the realm of burnishing materials. A study of tumbling equipment is also included.

ABRASIVE BELT POLISHING, *by E. E. Oathout.*

Factors in the choice of equipment, heads, and belts are discussed. Case histories are presented which give details of the procedure used and the advantages gained in lower cost and higher rates of production.

FLAT POLISHED PHOSPHATE COATED STEEL REDUCES POLISHING COST, *by H. J. McVey and V. M. Darsey.*

Automatic polishing of steel in the flat followed by phosphate coating and lubrication to protect the surface during the forming operation has sufficient economic advantages over polishing of formed articles that a part of the automobile industry has turned to this method for bumpers and other parts. The steps in this procedure, including the cleaning prior to phosphating, are discussed, and the advantages are presented.

WATER BASE BUFFING LIQUID, *by E. T. Candee and S. L. Doughty, Jr.*

The history and present practice of buffing with bar compounds are presented, including their advantages and disadvantages. Data are given on characteristics of water-base buffing liquids, their application and economy and on types of equipment and their application. Information is included to help the manufacturer decide what type of compound to adopt for each product.

REPORTING AND USE OF RESEARCH DATA, *by G. M. Cole.*

It is important that the membership understand and make full use of reports emanating from A. E. S. research projects. The immediate usefulness of the reports

H. L. KELLNER,
C. L. FAUST,
G. W. JERNSTEDT,
C. E. REINHARD,
L. WEISBERG.

A. H. DUROSE,
W.P. KARASH,
K. S. WILLSON;
W. L. PINNER,
Session Chairman,
H. M. GOLDMAN

ABSTRACTS OF CONVENTION PAPERS

on the research work as it progresses varies with the nature of the work. Some are complete and independent, such as an analytical procedure from Project No. 2. Another may be of immediate use although not independent of other reports, such as one from Project No. 5 on "The Effect and Removal of Copper from Nickel Plating Solutions". Others, such as those from Project No. 6, require study and interpretation before practical applications can be expected. In all instances the reader must determine how he can best use the information contained in the research reports.

Why Pay for Porosity Research? *by W. A. Wesley.*

In spite of the fact that over 100 laboratories in the United States are doing experimental work in electrodeposition there is an urgent need for fundamental research in this field. The reason is that an industry cannot continue to advance through applied technical research and development when the supply of new scientific knowledge dwindles. This seems to have been the situation with regard to porosity research. The significance to the plating industry of the work on porosity sponsored by the A. E. S. is brought out by discussion of its seven important new contributions to fundamental knowledge of the nature of porosity. Eight specific clues, or ideas, emanating from reports by Project No. 6 are already stimulating new technical research on the protective value of electrodeposits.

Use of Radioactive Isotopes for the Determination of Current and Metal Distribution in Electrodeposition, *by John Kronsbein.*

A known fraction of radioactive copper 64 is introduced into a copper sulfate solution, from which copper is deposited upon a cathode at a known average current density. The cathode is then cut into strips, and the amount of codeposited radioactive copper is determined by means of a Geiger Counter. The distribution of radioactive, and therefore also of stable, copper on the cathode can thus be established within very close limits. Extremely thin deposits may be deposited and yet satisfactory distribution determinations made. The method is especially suitable for ascertaining primary current distribution on an electrode. Another method to illustrate primary metal distribution by means of radioactive isotopes is to proceed as above with the application of part radioactive and part stable copper in known proportions and then to use the radio autographic technique of photographing the disintegrating copper atoms. At those parts of the cathode where most copper is deposited there will be most disintegrations and consequently the photographic film will be most blackened. These techniques are described in detail, and sources of errors are pointed out.

E. E. Oathout;
H. J. McVey,
V. M. Darsey,
E. T. Candee,
S. L. Doughty, Jr.

B. C. Case,
Session Chairman,
G. M. Cole;
W. A. Wesley;
J. Kronsbein

PLATED WARE EXHIBITS

PARLOR A, HOTEL STATLER

AT YOUR Convention this year, exhibits of Plated Ware submitted by Branches and Individual Members of the A. E. S. are being displayed in Parlor A of the Hotel Statler. These are the only exhibits to be shown at this 37th Convention.

In addition to the competition between the Branches for the honor of having a prize-winning display, opportunity is also being given to the Individual Members to present exhibits for other prizes. An impartial committee composed of representatives from five different Branches will have the unenviable task of selecting the three best Branch Exhibits and the three best Individual Member Exhibits.

A visit to the Plated Ware Exhibits will be worth while for everyone in attendance at the Convention and will be a tribute to those Branches and Individual Members cooperating in the Exhibit.

TIME SCHEDULE FOR BRANCH EXHIBITS

Monday, June 12.....12:00 Noon to 6:00 P. M.
Tuesday, June 13..... 9:00 A. M. to 6:00 P. M.
Wednesday, June 14..... 9:00 A. M. to 12:00 Noon

HAROLD NARCUS, *Chairman*
Branch Exhibits Committee

PLANT VISITATIONS

AN INTERESTING and elaborate Plant Visitations program is assured for the Annual Convention. This will include visiting the shops of manufacturers and job platers doing the most in the way of plating and anodizing.

In addition, arrangements are being made to visit shops in the Worcester and Attleboro areas for those who wish to stop on their way home from the Convention.

Complete details of these trips, including schedules and means of transportation, will be available throughout week at the Registration Desk of Convention Headquarters.

Check on this information as soon as you arrive!

RICHARD I. FURBUSH, *Chairman*
Plant Visitations Committee

PRO-BRITE

A New Lime Finish for High Color at Low Cost

HERE is new brilliance in coloring nickel, brass, copper and aluminum . . . new mileage . . . new speed . . . new cleanability—with a new series of lime finishes which are a totally new development in buffing compositions.

Prozite is a unique natural abrasive, available for industrial use for the first time, which offers unlimited possibilities for increased performance and lower cost for the metal finisher.

New bases developed for use with this abrasive set a new level for cleanability and the chemical balance which has been attained gives the lime finishes excellent resistance to slaking.

PRO-BRITE lime finishes go farther, last longer, clean easier, cost less to use. They are worth your investigation.

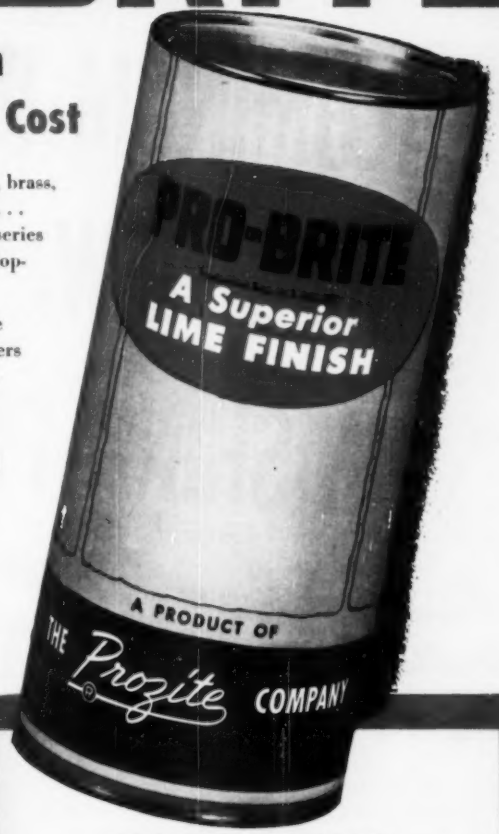
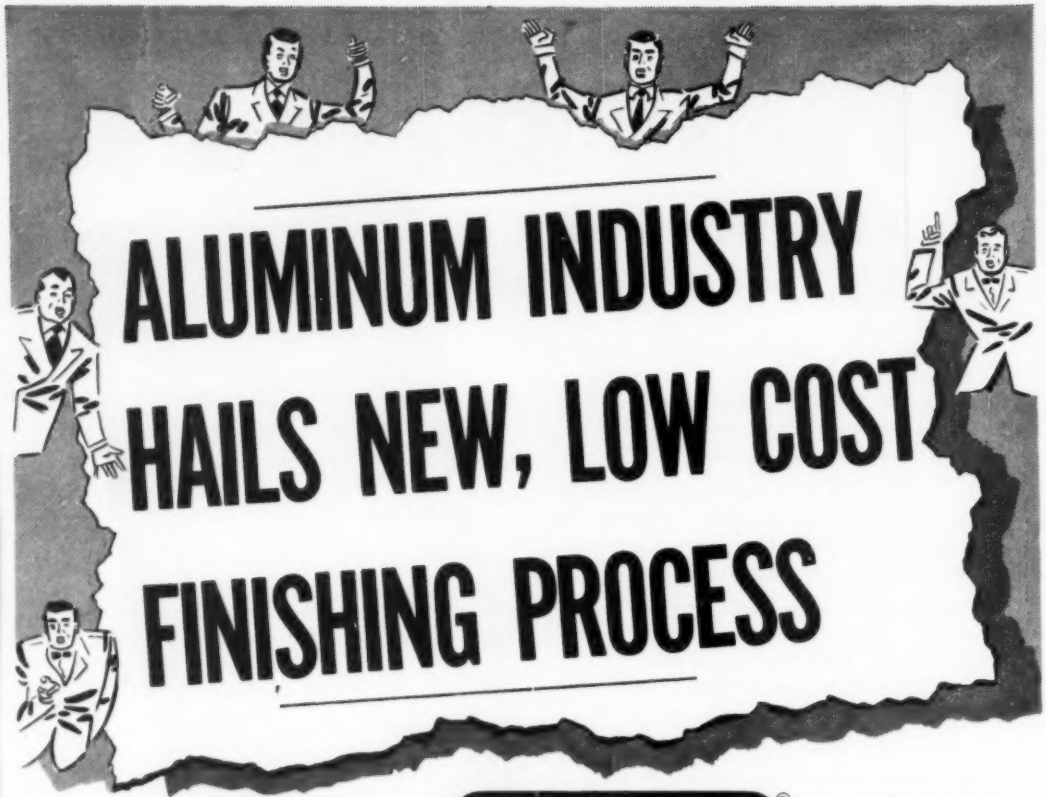


Photo in Prozite laboratories.

SEND FOR CATALOG

The new Prozite catalog describes Prozite solid and liquid compositions for finishing non-ferrous metals, die castings, stainless and regular steel, precious metals, rubber, plastics, etc., and describes the Prozite technical approach to your finishing problems. Anyone is welcome to a copy—free on request.

THE Prozite DIVISION
Gerity-Michigan Corporation
Adrian, Michigan



ALUMINUM INDUSTRY HAILS NEW, LOW COST FINISHING PROCESS

Aluminum fabricators say IRIDITE® AL-COAT fills long-sought need for non-electrolytic corrosion resistant coating

Now you can apply a clear protective Iridite film to mill or buffed aluminum surfaces in as little as 10 seconds . . . without changing the appearance of the metal. Or, a highly protective yellow colored film can be produced from a one to two minute immersion.

Since its introduction, Iridite Al-Coat has been widely acclaimed for its ease and speed of application, superior corrosion resistance and low cost. Because of its simple operation, Iridite Al-Coat is replacing more complicated and expensive electrolytic processes for providing a corrosion resistant final finish or paint base for aluminum surfaces.

Write or wire direct, or ask your Iridite representative for full information and samples. Or, send us a sample of your product for test processing.

Here's Why It's Best For You . . .

APPLICATION—*Dip, spray or brush* . . . **ONE SOLUTION**—*No heat or current—single dip* . . . **FAST PRODUCTION**—*Few seconds to 2 minute immersion* . . . **CORROSION RESISTANCE**—*Up to 1,000 hours salt spray on wrought stock, 250 hours on castings. Meets all military specifications* . . . **ABRASION RESISTANCE**—*No flaking or peeling from buffing, bending or scraping* . . . **PAINT BASE**—*Blocks underfilm corrosion* . . . **APPEARANCE**—*Color selection—clear or yellow* . . . **WELDABILITY**—*Can be spot welded; aids shielded-arc welding* . . . **CONDUCTIVITY**—*Low surface electrical resistance* . . . **LOW COST**—*SAVES UP TO 50% OVER OTHER PROCESSES*

ALLIED RESEARCH PRODUCTS, INC.

4004 EAST MONUMENT STREET

BALTIMORE 5, MD.

REPRESENTATIVES IN PRINCIPAL INDUSTRIAL CITIES; WEST COAST--L. H. BUTCHER CO.

MANUFACTURERS OF IRIDITE FINISHES FOR CORROSION RESISTANCE AND PAINT SYSTEMS FOR NON-FERROUS METALS: ARP PLATING CHEMICALS

ANNUAL REPORTS OF OFFICERS

of the

American Electroplaters' Society

PRESIDENT'S REPORT

Logozzo

The year just past was once again fraught with numerous problems of policy for the Executive Board. The Board started handling these problems exactly one week after the Milwaukee Convention and has been busy ever since that time.

Convention Financing

The first item of importance was the method of financing the 1950 Boston Convention. The 1947 Detroit Convention and the 1948 Atlantic City Convention had Industrial Finishing Expositions to carry the financial load. It was decided at both of them to forsake the paid-advertising convention program because of the printing costs eating up the lion's share of the revenue. The Milwaukee Convention had no Exposition, this to comply with a request by the International Fellowship Club to dispense with the annual paid exhibits as too costly and not too productive when run too frequently. The Milwaukee Committee then resorted to a subscription campaign for funds with which to insure a successful Convention last June. The Boston Committee, when informed it would not have an Industrial Finishing Exposition, stated it wanted a program with paid advertising to bring in the necessary revenue. There was considerable supply-house opposition to this plan. The Executive Board polled the suppliers and found approximately 70 per cent of them opposed to paid advertising and in favor of a subscription campaign for underwriting the Convention. The Boston Committee, while favoring the paid-advertising program, decided to follow the wish of the majority and is governing itself accordingly. It was also decided to send a closing financial report and a thank-you letter to all contributors.

Manson Glover, General Chairman of the 1950 Boston Convention, submitted a program and a budget that were heartily approved by the Executive Board. Leonard Chesworth acted as liaison to the Editorial Board, and an excellent educational program was planned.

Another important step was initiated by the Executive Board. To insure working capital for future Conventions, the profit from the 1949 Milwaukee Convention (approximately $2,500.00) was set up as a reserve fund. It was decided to hold a maximum of $3,000.00 for this purpose.

1952 Exposition

The following were appointed by the President to handle the Industrial Finishing Exposition for 1952: A. K. Graham, Chairman; Clyde Kelly, Chicago Branch; Herberth Head, Detroit Branch; C. F. Nixon, Second Vice-President, Liaison to the Executive Board. Clyde Kelley is Acting Chairman of the Chicago Convention, which will be held June 15, 1952 in the Stevens Hotel. The above named committee has chosen, with Board approval, the south wing of the Amphitheatre for the Exposition. This will be quite a break for the A. E. S. gourmets because of the close proximity of the "Sirloin and Saddle" eatery.

Publicity

The Publicity Committee, under the guidance of W. M. Phillips, continued its activity and also augmented it by the addition of S. E. Sangster, a professional writer, who was assigned the task of publicizing the plating industry in various National publications.

New Branch

The A. E. S. continues to annex new Branches. On October 21, 1949, C. F. Nixon presented a charter to the Western Ontario Branch.

Publication

The *Proceedings* were mailed by January 1, well in advance of last year's late date. This represents a four-month improvement in mailing date, and most members let the Executive Board know of their gratefulness.

During the past year the newly designed members' certificates were made available through the Branch secretaries. Also available for the first time were Past Presidents' and Award of Merit certificates, which were gratefully received by certain qualified constituents of the Society.

Honorary Membership

The Executive Board took a definite stand on the qualifications necessary for approval of candidates for election to honorary membership of the Supreme Society. There have been no definite rules and regulations governing this action in the past; but, with the large number of honorary members now listed, definite action was needed to prevent this roster from exceeding in number the general membership of the A. E. S. In short, your candidate has to be more than just a good guy to get consideration in the future.

It would be a physical impossibility to list here all of the actions of the Executive Board during the past year; hence only a few highlights have been presented in this report.

Acknowledgments

The one thing that is most apparent in A. E. S. activities is the willingness of many of our members to contribute time and effort for the betterment of our industry. The time spent, completely without pay, by members of our Research Committee, Editorial Board, Executive Board, and the various standing committees would add up to a terrific bill if it were ever totaled and presented.

The entire Executive Board joins me in expressing thanks to all of these people for their cooperation. The paid staff in Jenkintown also merits our gratitude for the job they have done for us.

Arthur W. Logozzo

FIRST VICE-PRESIDENT'S REPORT

Neill

The First Vice-President's duties include the important task of furthering the educational aims of the Society.

Educational Films

During the year just past we finally brought to completion the compilation of a film directory for use of the Branches in securing the benefits which this medium provides, for both education and entertainment. Used intelligently, it can be of great benefit in enhancing the value of the Branch meetings by disseminating knowledge and furnishing variety, so necessary to a well rounded program.

Another project, which it is hoped can be carried to a speedy conclusion, is the production of a composite film, made up of the best portion of a number of films produced within and outside the industry. When put together, this film should make a continuous and interesting story of electroplating as an industry and show the place it holds in the economic scheme of our everyday life.

Branch Speakers List

In addition, a Speakers List is again being prepared, to be published, as in the past, in the July issue of Plating. It will furnish the most outstanding cross section of speakers in the field of plating, every one with a topic of interest and value to the membership.

Meetings

Your First Vice-President has attended all board meetings held during the year and has visited the following Branches: Toledo, Cincinnati, Dayton, Pittsburgh, Chicago, Grand Rapids, and St. Joseph Valley. Indianapolis is still to be visited in May.

Acknowledgment

I wish to thank the many persons who have cooperated so wholeheartedly in making my various duties both pleasant and fruitful. Especially I like to thank the Branches I visited for the many considerations shown me.

William J. Neill

SECOND VICE-PRESIDENT'S REPORT

Nixon

The Branches

Two Canadian Branches, the Western Ontario Branch and the Hamilton Branch, have been granted permanent charters They have started with a fine enthusiasm which promises much for the future. They will prosper, as will our older Branches, as they ever keep in mind our Society's object: ". . . the improvement and dissemination of knowledge . . . and the development of a cooperative spirit of friendship and mutual assistance among its members".

We now have forty-four Branches, of which three are in Australia, two in California, and one in Georgia. The remaining thirty-eight are clustered in the northeastern part of the United States and in the southeastern part of Canada.

Membership Changes

A little less than half of our forty-two established Branches (nineteen) gained in membership. Detroit led the first group with a new increase of 56 members and a 13.3 per cent increase in the membership competition. Melbourne led the second division with 30 new members and a 37.0 per cent increase, while the Southeastern Branch took the honor in the third group with 16 new members and a 40.8 per cent increase. Performance of all of our

TABLE I. A.E.S. MEMBERSHIP DATA 1945–1950

BRANCH	May 1 1945	May 1 1946	May 1 1947	May 1 1948	April 1 1949	April 1 1950
Adelaide	...	37	49	65	76	72
Allentown-Reading	...	...	...	...	43	37
Baltimore-Washington	121	114	117	96	83	85
Boston	157	168	156	164	153	142
Bridgeport	118	124	147	154	160	155
Buffalo	89	87	98	94	82	77
Chicago	357	359	410	445	391	372
Cincinnati	57	58	55	80	90	87
Cleveland	144	177	190	190	186	195
Columbus	...	34	35	38	38	47
Dayton	109	87	95	89	98	93
Detroit	390	440	418	407	427	483
Grand Rapids	119	116	138	148	160	141
Hamilton	...	...	...	...	...	23
Hartford	127	134	140	150	133	132
Indianapolis	112	90	103	101	104	94
Jackson-Lansing	63	85	65	64	59	57
Lancaster	39	38	38	46	59	62
Los Angeles	151	181	195	234	217	201
Louisville	...	...	...	18	20	25
Melbourne	...	59	60	68	81	111
Milwaukee	107	120	124	128	132	124
Montreal	54	61	59	63	69	68
Newark	213	243	253	280	256	238
New Haven	106	110	114	106	108	106
New York	191	201	257	273	257	280
Philadelphia	154	170	191	207	187	192
Pittsburgh	80	97	126	145	136	142
Providence-Attleboro	101	122	126	116	109	112
Rochester	90	97	87	120	125	104
Rockford	23	53	64	59	56	64
Saginaw Valley	...	...	...	38	67	64
St. Joseph Valley	...	60	88	98	80	66
St. Louis	116	122	96	103	107	97
San Francisco	55	64	76	76	71	66
Southeastern	...	...	43	49	38	54
Springfield	73	82	49	56	50	51
Sydney	51	82	78	88	108	109
Syracuse	57	64	73	77	83	85
Toledo	54	60	55	66	56	49
Toronto	119	131	136	146	154	124
Twin City	52	72	90	78	77	71
Waterbury	122	128	126	128	122	125
Western Ontario	...	...	...	...	...	23
Members-at-large	...	...	78	83	100	104
In Transfer	...	...	...	21	21	27
Total Active Members	3,971	4,527	4,898	5,255	5,229	5,236
Sustaining Members	...	166	244	235	220	225
Honorary Members*	13	12	13	16	15	16

*Included in Branch member.h.p.

Necrology

The following members have died during the year. Many of them contributed greatly to the advancement of the Society, which, with their Branches and friends, mourns their passing:

Baltimore-Washington Branch: Matthew J. Kraft
Boston Branch: Charles O. Hardy, William H. Harney
Buffalo Branch: H. Wood
Chicago Branch: C. M. Campbell, Calvin S. Gordon, Gus Jelinek, R. H. Ruenzel
Cincinnati Branch: Walter M. Mayer
Detroit Branch: R. C. Allen, R. D. Alsdorf, L. C. Jones, H. F. Lenz
Grand Rapids Branch: Lewis Parker, Richard Alden
Los Angeles Branch: Adolph Jehnke, Ernest Lamoureaux
New Haven Branch: Joseph L. Downes
New York Branch: Le Roy E. Putnam
Philadelphia Branch: William F. Mershon, Elmer E. Savage
Providence-Attleboro Branch: James T. Kelly
Rochester Branch: Floyd Oplinger
St. Joseph Valley Branch: Worth W. Mathews
Twin City Branch: Edward O. Granoien
Members-at-Large: L. G. Johnson, David Mitchell, Pablo A. Sacerdote

TABLE II. CHANGES IN ACTIVE MEMBERSHIP 1949–1950

BRANCH	Membership April 1, 1949	Elected	Reinstated	Transferred In	Transferred Out	Resigned	Suspended	Dead	Net Gain	Membership March 31, 1950
Adelaide	76	7	1	..	..	4	8	..	− 4	72
Allentown-Reading	43	3	..	4	..	1	12	..	− 6	37
Baltimore-Washington	83	8	..	5	2	3	5	1	+ 2	85
Boston	153	10	24	..	3	1	39	2	−11	142
Bridgeport	160	9	3	..	7	2	8	..	− 5	155
Buffalo	82	8	2	1	2	1	12	1	− 5	77
Chicago	391	41	6	5	3	8	56	4	−19	372
Cincinnati	90	15	..	1	1	1	16	1	− 3	87
Cleveland	186	23	5	4	3	1	19	..	+ 9	195
Columbus	38	14	2	..	1	..	6	..	+ 9	47
Dayton	98	5	4	2	3	2	11	..	− 5	93
Detroit	427	97	2	5	7	5	32	4	+56	483
Grand Rapids	160	16	2	..	1	5	29	2	−19	141
Hamilton	...	17	..	6	..	..	..	..	+23	23
Hartford	133	13	4	2	2	13	5	..	− 1	132
Indianapolis	104	11	..	2	2	2	19	..	−10	94
Jackson-Lansing	59	5	..	2	3	1	5	..	− 2	57
Lancaster	59	6	..	..	..	1	2	..	+ 3	62
Los Angeles	217	19	2	1	1	15	19	3	−16	201
Louisville	20	6	..	1	..	2	..	..	+ 5	25
Melbourne	81	41	..	..	..	11	..	..	+30	111
Milwaukee	132	15	..	..	1	..	22	..	− 8	124
Montreal	69	11	1	1	1	2	11	..	− 1	68
Newark	256	22	5	1	5	14	27	..	−18	238
New Haven	108	3	..	5	..	..	9	1	− 2	106
New York	257	41	1	3	2	6	14	..	+23	280
Philadelphia	187	20	4	..	2	1	14	2	+ 5	192
Pittsburgh	136	22	1	5	1	10	11	..	+ 6	142
Providence-Attleboro	109	7	..	1	1	2	1	1	+ 3	112
Rochester	125	..	1	..	1	..	20	1	−21	104
Rockford	56	8	..	..	..	..	..	..	+ 8	64
Saginaw Valley	67	6	..	..	..	..	9	..	− 3	64
St. Joseph Valley	80	6	2	..	..	4	17	1	−14	66
St. Louis	107	14	..	1	1	9	15	..	−10	97
San Francisco	71	22	..	..	..	4	23	..	− 5	66
Southeastern	38	21	..	1	..	..	6	..	+16	54
Springfield	50	4	1	..	..	1	3	..	+ 1	51
Sydney	108	11	..	..	1	2	7	..	+ 1	109
Syracuse	83	8	..	2	2	1	5	..	+ 2	85
Toledo	56	2	4	..	1	..	12	..	− 7	49
Toronto	154	10	..	1	10	6	25	..	−30	124
Twin City	77	7	2	..	..	5	9	1	− 6	71
Waterbury	122	8	1	..	1	1	4	..	+ 3	125
Western Ontario	...	19	..	4	..	..	..	..	+23	23
At-Large	100	25	4	3	4	1	20	3	+ 4	104
In Transfer	21	..	..	6	..	..	..	..	+ 6	27
Total	5,229	686	84	75	75	148	587	28	+ 7	5,236

Branches for the year just ended as well as for the past several years is shown in Table I.

Over-all there was a slight gain in 1949–1950. While it is encouraging to note from the detailed report on membership changes in Table II that during this year 686 new members joined our Society and 84 were reinstated, it is somewhat disheartening to realize that almost an equal number of old members were lost. Surely, with added effort some of these resignations or suspensions could have been avoided—people involved were sold on A. E. S. once.

It is with sincere regret that we note the passing of a number of our members. Their names are found in the accompanying necrology.

For Future Growth

As a goal for the future, it is considered reasonable that we may aspire to a membership of 10,000. It has been estimated that there are now at least 8,000 establishments in the country in which plating is done. Our new Constitution makes membership available to all who are interested in electroplating and provides a membership-at-large status for those residing in areas not served by any Branch. Partly as a result of the efforts of our Research Committee and almost entirely as the result of the efforts by members of A. E. S., many important improvements in plating practice may be expected during the next few years. Our journal Plating will spread the news; anyone interested in plating can ill afford to be without it. A membership drive in the ordinary sense is not suggested; rather, a persistent, aggressive effort continuing from year to year is needed. A number of things were started with this thought in mind.

Spurred on by President Logozzo, all of our Branches excepting only those in Australia have been visited by at least one member of the Executive Board. In many Branches the paper entitled "Your American Electroplaters' Society", which tells our story in some detail, has been presented with the two-fold thought in mind: first, to invite constructive criticism and, second, to make our members realize more fully the magnitude and importance of our Society.

During the year your Second Vice-President visited the following Branches: Western Ontario, Chicago, Detroit, Cleveland, Twin City, Grand Rapids, Toronto, Jackson-Lansing, Milwaukee, and Hartford.

An effort is being made to reach platers in the large areas of the country not now served by any Branch in the hope of securing more members-at-large. It is hoped further that as the number of members-at-large increases in a given locality new Branches will develop. An effort was made to stimulate the Branch Membership Committees to increased activity by means of letters directed to

the Branch Membership Chairmen. A full-scale selling campaign is being developed for the purpose of securing more sustaining members.

Miscellaneous Activities

In addition to his duties as the Society's Membership Chairman, the Second Vice-President served as liaison member on the Public Relations Committee, attended all Executive Board meetings, and to the best of his ability carried out routine chores and special assignments imposed by the President.

Acknowledgment

I should like to express appreciation for the cordial hospitality extended by all Branches visited and for the important help received from so many of our members that it would be difficult to list them all.

C. F. Nixon

THIRD VICE-PRESIDENT'S REPORT

MacStoker

While your Third Vice-President is not constitutionally assigned specific duties, he has been traditionally charged by the President with the responsibility of furthering the efforts of the plated-ware exhibits chairman of the Annual Convention Committee to the end that this important Convention feature be enhanced and expedited. Present indications are that the 1950 plated-ware exhibits at the Boston Convention will be worthy of the interest of all, a substantial number of the Branches having promised an impressive display of the metal finisher's art.

In addition, your Third Vice-President has been asked by the President to visit a number of the Branches in his section. He has appeared and spoken at New York, Newark, and Bridgeport Branch meetings and has other visitations to make in Waterbury, Lancaster, and Allentown-Reading.

He has acted by appointment as A.E.S. official observer at sessions of the United Nations Scientific Conference on Conservation and Utilization of Resources at Lake Success, N. Y. He has attended all but one of the meetings of the Executive Board and has contributed in a modest way to the conduct of its business. He regrets that he has not had more time and opportunity to serve with the other members of the Board, whose contributions are so much greater.

Franklyn J. MacStoker

EXECUTIVE SECRETARY'S REPORT

Graham

Income and Expenditures

The auditor's report on the General Fund of the Society for the fiscal year from April 1, 1949 to March 31, 1950 has been reclassified in Table I to show the accounts for the Society apart from those or the publication Plating.

The Society shows a total income of $37,461.66 against total expenditures of 1,815.48. The excess expenditure over income for the Society operation is $4,353.82.

The income includes under item 6, Miscellaneous Income, $10,200.00 transferred from reserve as provided in the budget and other miscellaneous income amounting to $218.66. It also includes, under item 7, $2,515.11 profit from the Milwaukee Convention which has been placed in a separate Convention account as provided by the Executive Board. In addition, under item 8, a sum of $5,000 was transferred from reserve in accordance with an Executive Board ruling to pay for reservation of space for the Industrial Finishing Exposition in Chicago in 1952.

The income from per capita tax on active and sustaining members under item 4 and from dues of members-at-large under item 5 is shown less one-half the subscription rate for Plating as provided by the Constitution. If the profit from Plating for the fiscal year, amounting to $2,961.87, is deducted from the excess expenditure over income, it reduces the loss for operation of the Society to $1,391.95. This loss is not necessarily the result of excess expenditure in connection with any one of the items 10 to 18 but rather the reduction in Society income which becomes apparent when one deducts half the subscription rate for Plating from the dues and per capita tax received by the Society. This shows in stark reality, as stated last year, that the Society as now operated cannot support itself from the present sources of income without a substantial profit from the publication.

Branch Activities

An indication of the activity of the Branches of the Society is best obtained by reviewing their performance with respect to the following assignments.

Out of 44 Branches, 15 have adopted Branch by-laws, 31 have appointed research committee representatives, 34 have compiled historical data on the Branch, 25 have chosen and established Branch libraries, and 29 replied to the urgent telegram request for anticipated attendance at the Los Angeles Convention.

There were 283 Branch news items published in Plating during the fiscal year, representing an average of 6.4 items for each of the 44 Branches as compared with 6.5 items in the previous year. These items serve as a recorded history of the Branches' activities and are required by the Constitution and By-Laws. It is hoped that an improvement can be shown during the year 1950–1951. A comparison for the last two years is shown below:

Fiscal Year	1948–1949	1949–1950
Number of Branches	43	44
10–18 Items	6	6
5– 9 Items	24	25
1– 4 Items	13	12
0 Items	0	1

There were 22 general communications on Society matters sent to the Branches from the office of the Executive Secretary, not including the A. E. S. News Letter which was sent to all officers and board members of each Branch at intervals. The cooperation of the Branches with the National Office was excellent.

The Executive Secretary spoke before the Los Angeles, San Francisco, Louisville, and Southeastern Branches during the past year.

Publications

The print order for the April, 1950 issue of Plating was 6,900 copies. It has not increased substantially owing to a loss in membership abroad, resulting from currency difficulties, and to a very small net increase in Society membership. Thirty-six copies of Dr. Samuel Glasstone's book, "Electrochemistry and Electrodeposition", were sold during the year.

The *Proceedings* of the Technical Sessions of the 1949 Convention were published and mailed to members by

January 1, 1950. This volume sells at the established price of $5.00 per copy to nonmembers. There is still a supply available for any who may wish to purchase this valuable volume. The back volumes for 1946, 1947 and 1948 are also being sold at the established price of $5.00. Again we wish to remind the members that they receive a copy of each year's *Proceedings* as part of their membership dues provided their names are on the Society's mailing list, as members in good standing, prior to August 31 of that year. A member joining the Society after August 31 must purchase his copy of the *Proceedings* for the year in question.

The Editorial Board held three meetings. It cooperated closely with the editors of PLATING and assumed full responsibility for the papers for the educational sessions of the 1949 and 1950 Conventions. Plans are also under way for acquisition of papers for the technical sessions of the Los Angeles 1951 Convention. It is generally agreed that the Editorial Board has proven to be most efficient and practical in its handling of these matters. The members of the Board are rendering the Society a real service, which should be fully appreciated by all the members.

OTHER SOCIETY ACTIVITIES

The Executive Board completely revised and standardized the paper awards. The details have been published in the June issue of PLATING. These changes will apply to the paper awards to be made at the 1950 Convention.

A large number of inquiries were received for technical information and assistance, a number of which were written up for the Question Box department of PLATING. There were also an increasing number of requests for job assistance, all of which were processed through the headquarters office.

The International Amphitheater in Chicago was reserved for the Third Industrial Finishing Exposition sponsored by the Society during the week of June 16, 1952 at Chicago, Ill. The Industrial Finishing Exposition committee is now actively engaged in planning the promotion of this exposition.

The Executive Secretary attended three Editorial Board meetings, five Research Committee meetings, six Executive Board meetings, two Industrial Finishing Committee meetings, two Handbook Committee meetings, three Public Relations Committee meetings, two Los Angeles Convention Committee meetings, and two Boston Convention Committee meetings.

COOPERATIVE ACTIVITIES

The Society is cooperating with a number of outside associations and agencies. A committee is being appointed to work jointly with the National Association of Metal Finishers in the development of matters of mutual interest to the members of both organizations We have representation on the American Standards Association's Sectional Committee on Safety Code for Exhaust Systems, Z9, and cooperated effectively in the development of an acceptable standard pertaining to open-tank ventilation.

Vice-President Neill participated in deliberations of the Ohio Valley Sanitary Water Commission, an activity under the U. S. Public Health Service. Largely through the alertness of the Detroit Branch, we have one of its members serving as a member of the President's Water Pollution Control Advisory Board. The same Branch is also taking an active part in matters pertaining to the disposal of plating room wastes in the State of Michigan.

The National office supplied data to the Department of Labor, Bureau of Labor Statistics, Washington, D. C. Dr. R. M. Wick and K. M. Huston are the Society's representatives on the Inter-Society Corrosion Committee of the National Association of Corrosion Engineers. Last, but by no means least, our very pleasant and profitable joint activities with the American Society for Testing Materials on matters pertaining to plating specifications and recommended practices are continuing.

TABLE I. RECLASSIFICATION OF SOCIETY ACCOUNTS IN GENERAL FUND

Item	INCOME	Actual 1949–1950
1	Sale of *Proceedings*	$ 1,062.90
2	Sale of Book, Reprints, Branch Supplies	2,951.44
3	Interest	1,569.60
4	Per Capita Tax for Active and Sustaining Members, less one-half subscription rate for PLATING (42.6%)	13,326.01
5	Dues from Members-at-Large, less one-half subscription rate for PLATING (37.5%)	617.94
6	Miscellaneous:	
	(a) From reserve	10,200.00
	(b) Other	218.66
7	Convention Account (from Milwaukee Convention)	2,515.11
8	Industrial Finishing Exposition Account (from reserve)	(5,000.00)*
	Total	$ 37,461.66
	(Excess Income over Budget)	($2,474.42)
	EXPENDITURES	
10	*Proceedings*	$ 13,816.25
11	Books, Reprints, Furniture, Fixtures, Office Equipment, and Branch Supplies	2,489.42
12	Convention Account	1,163.47
13	Industrial Finishing Exposition Account	(5,000.00)*
14	Officers' Office Expense	144.85
15	Salaries	9,200.00
16	Officers' Travel Expense	2,342.05
17	National Office Expense	4,146.28
18	Educational—Public Relations	3,513.16
	Total	$ 41,815.48
	(Excess Expenditures over Budget)	(365.48)
	Excess Expenditures over Income	4,353.82
	Less Profit from PLATING	2,961.87
	Net Loss	$ 1,391.95

*Not in original budget.

ACKNOWLEDGMENT

This past year there were five personnel changes in the headquarters staff, including both the advertising and production managers of PLATING. The personnel situation for the time being appears to be stablized. The cooperation of the headquarters staff is hereby gratefully acknowledged.

A. KENNETH GRAHAM

AUDITOR'S REPORT

March 31, 1950.

THE SUPREME SOCIETY OF
THE AMERICAN ELECTROPLATERS' SOCIETY, INC.
Jenkintown, Pa.

Gentlemen:

We have examined the balance sheets of the General Fund and Research Fund of the Supreme Society of The American Electroplaters Society, Inc., as of March 31, 1950, and the related statements of Income and Expenses of said funds for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances, with the exception that we did not confirm the amounts due from dues of members-at-large and from sales of branch supplies.

The accompanying balance sheet and statement of income and expenses of the General Fund are exclusive of certain accounts as more fully described in Notes A and B attached thereto.

In our opinion, the accompanying balance sheets and statements of income and expense, except as indicated above, present fairly the financial position of The Supreme Society of The American Electroplaters' Society, Inc., as of March 31, 1950, and the income and expenses for the year then ended.

Very truly yours,

LAURENCE E. BROWN & COMPANY
Certified Public Accountants

Philadelphia, Pa.

FINANCIAL STATEMENT OF THE SUPREME SOCIETY OF THE AMERICAN ELECTROPLATERS' SOCIETY, INC.

General Fund

BALANCE SHEET, MARCH 31, 1950

ASSETS

Demand Deposit, Jenkintown Bank & Trust Company		$ 5,650.70
Petty Cash		25.00
Time Deposits:		
American National Building and Loan Association, Baltimore, Md.	$ 5,000.00	
Augusta Building and Loan Association, Baltimore, Md.	5,000.00	
Aurora Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
Peoples Federal Savings and Loan Association, Detroit, Mich.	5,000.00	
Progress Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
Savings Fund Society of Germantown, Philadelphia, Pa.	5,000.00	
Standard Savings and Loan Association, Baltimore, Md.	5,000.00	
Standard Savings and Loan Association, Detroit, Mich.	5,000.00	

RESEARCH COMMITTEE CHAIRMAN'S REPORT

Tucker

The research program enjoyed a successful year with an accelerated rate of progress being attained. The year's work may best be broken down into a number of general divisions for purposes of presentation. The order of presentation should not be construed to represent the importance of the activity.

POLICY

As should be, the major goal and policies of the Committee remained unchanged. The research program must remain free from bias and should yield an advantage to no interest other than the whole. This principle was followed, although it is becoming evident as the program grows that some modifications must be made with regard to utilization and indirect evaluation of proprietary processes. This change in basic position will require the Committee to exercise even greater care to avoid bias, so that it will be able to build that confidence which alone will allow the owners of proprietary processes not only to continue their support but, even more importantly, to submit their processes for utilization and an inevitable degree of evaluation.

A questionnaire was submitted to those attending the Milwaukee Convention. Twenty-three answers were received. Those who expressed opinions generally approved the committee's policies and projects; however, the major goal of the questionnaire was not attained, since it had been hoped to ferret out more constructive criticism and suggestions.

STATUS OF PROJECTS

The committee has nine active projects. These projects are listed herewith. Progress on these projects was generally satisfactory and is detailed as follows:

Project No. 2, "The Determination of Impurities in Electroplating Solutions", made outstanding progress. Methods for important trace metallic contaminants in copper plating baths were developed and published, and methods for all metallic impurities in zinc plating baths except iron are in the confirmatory stage in various cooperating laboratories. The procedure for trace metallic contaminants in nickel baths are now available in Research Reports Nos. 3 and 6. Experi-

mental work began in the past year on macro-constituents, with boric acid and magnesium in nickel baths receiving first attention. The personnel on this project collaborated with those on Project No. 10, "Disposal of Plating Room Wastes", in the development of suitable methods for cyanide in concentrations of less than 10 ppm.

Project No. 4, "Effect of Surface Finish of Nonferrous Base Metals on the Protective Value of Plated Coatings", was not active experimentally; however, committee work continued. Three sets of rolled-brass panels surfaced in six conventional but different ways and plated with one combination of bright nickel and chromium have been on exposure under A. S. T. M. Committee B-8 supervision since early last summer. These sets were placed at Murray Hill, N. J., State College, Pa., and Kure Beach, N. C. No official inspection has been made as yet, but the panels were observed several times, and it is reported that an official inspection is planned at an early date because the first observable changes are now evident. The Project Committee has in preparation a full report on the techniques used in the preparation of the brass panels and on the causes for the unsuccessful efforts to process the flat zinc-base diecastings. A new effort to complete the diecasting phase of this program is under way and offers hope for the placing of plated diecastings on the test racks next year.

Project No. 5, "Effect of Impurities and Purification of Electroplating Solutions", made excellent experimental progress in that the effects of copper and zinc in nickel baths were fully explored and the influence of iron virtually determined. The corollary work on the removal of these three metals progressed also, but the adequacy of the work possible was questioned, and it is now the hope of the Committee to divide this project in the interest of doing a more thorough job on both aspects of the problem. Publication of the results from this project lagged because of the problems encountered with form of submission. On account of the great interest on the part of all platers in the influence of impurities, the Project Committee has elected to utilize a form of publication unlike the average technical report. This form of presentation will leave the technical reader unsatisfied to a degree but will aid the mass of PLATING readers to grasp and use the results of the work. When the full details of this unique form of presentation have been agreed upon, separate papers on the influence of copper and zinc in nickel baths should appear in rapid order.

Project No. 6, "Nature and Effect of Porosity in Electrodeposits", has been the center of a growing controversy. With full realization of this situation, the Committee disseminated the monthly progress reports from this project to all

Suffolk County Federal Savings and Loan Association, Babylon, N. Y.	5,000.00	
Surety Savings and Loan Association, Detroit, Mich.	5,000.00	
Occident Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
Fidelity Federal Savings and Loan Association, Glendale, Calif.	5,000.00	
Atlanta Federal Savings and Loan Association, Atlanta, Ga.	5,000.00	
Home Building and Loan Association, Los Angeles, Calif.	5,000.00	70,000.00
Accounts Receivable:		
Advertising, Subscriptions, Books and Reprints	$ 4,221.64	
Members-at-Large	739.19	
Branch Supplies	9.20	4,970.03
Deposit with Bell Telephone Company		200.00
Deposit with Copyright Office		38.00
Total Assets (Note A)		$80,883.73

LIABILITIES AND FUND

Liabilities:		
Payroll Taxes withheld from Employees	$ 334.80	
Advertising Advance Payments	878.97	
Foreign Advances	30.02	
Total Liabilities		$ 1,243.79
General Fund:		
Balance, April 1, 1949	$98,231.89	
Deduct: Excess of Expense over Income for the year ended March 31, 1950, per attached statement	18,591.95	
Balance, March 31, 1950		79,639.94
Total Liabilities and Fund (Note A)		$80,883.73

NOTE A.: Exclusive of inventories of publications, literature and supplies, office furniture and equipment, accounts payable and prepaid and accrued expenses.

STATEMENT OF INCOME AND EXPENSES FOR THE YEAR ENDED MARCH 31, 1950

SUMMARY

Total Expenses (Note B)	$137,370.70
Total Income	118,778.75
Excess of Expenses over Income	$ 18,591.95*

NOTE B: The expenses reported do not take into account the changes during the period in inventories of publication, literature and supplies, office furniture and equipment, accounts payable and prepaid and accrued expenses.

*Since a total of $17,200 was appropriated from reserves for various activities, as explained in the Executive Secretary's Report and the budget, the true excess of expense over income not reflected in the auditor's report is $1,391.95.

Committee members and in a few instances to past Committee men and to noncommittee individuals. By now it is clearly evident that a new and powerful tool for the study of electrodeposited coatings has been developed in the permeability test. In passing, it should be stated that the permeability technique is no longer limited to strippable coatings but has been developed until sandwiches of different metals can be studied. It is peculiarly well adapted to the study of sandwiches based on iron and comprised of coatings of one or several of the metals copper, nickel, and chromium. This development was fortunate indeed.

Much work was done using the atmosphere over 12-*N* hydrochloric acid as a standard corroding agent and change in permeability as a measure of corrosion. Many of the findings of this research are potentially very significant and unfortunately without exception controversial at least in many quarters. This situation was a serious concern of the Committee, with the result that it was decided to continue work under Dr. Thon along the channels now being followed and to supplement these essentially abstract research studies with a corollary project which will have as its prime function the evaluation and application of the new research tool, permeability. This new research will require certain outdoor exposure tests, for after all it is in such exposure that plated coatings fail.

Project No. 7, "Methods for Testing Thickness of Electrodeposits", will be terminated this June. This Committee decision was based on the indicated completion of the comparative studies of the various means for measurement of the thickness of nickel and copper coatings, together with an indication that the probability of fruitful returns beyond these comparative studies was low. There is no sign that any new or revolutionary device or means for determining thickness would be forthcoming. The data which will be ultimately published should be most useful in the selection and application of the various methods and instruments available for determining thickness. Valuable information will also be published on the preparation of plated standards.

Project No. 8, "Polarization at Electrodes in Electroplating Processes", is classed as inactive; however, arrangements were made recently with Dr. Ralph A. Schaefer, former Project Committee Chairman, to complete the extensive bibliography the committee inherited as its only tangible evidence of the existence of this project.

Project No. 9, "Physical Properties of Electrodeposited Metals", completed all of the experimental work on the physical properties of electrodeposited nickel, including certain rechecking of data largely necessitated by a change in personnel. It is expected that the manuscript for this massive publication will be in the

Research Fund

BALANCE SHEET, MARCH 31, 1950

ASSETS		
Demand Deposit, Abington Bank & Trust Company		$ 5,686.68
United States Treasury 2% Bond due September 15, 1953 (Quoted Market Value $5,053.13)		5,000.00
Time Deposits:		
Atlantic Federal Savings and Loan Association, Baltimore, Md.	$ 5,000.00	
Baltimore Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
Birmingham Federal Savings and Loan Association, Birmingham, Mich.	5,000.00	
First Federal Savings and Loan Association, Waterbury, Conn.	5,000.00	
First Federal Savings and Loan Association, Detroit, Mich.	5,000.00	
Liberty Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
Loyola Federal Savings and Loan Association, Baltimore, Md.	5,000.00	
Philadelphia Savings Fund Society, Philadelphia, Pa.	5,000.00	40,000.00
Accounts Receivable, Research Reprints		118.80
Total Assets		$50,805.48
LIABILITY AND FUND		
Liability:		
Payroll Taxes withheld from Employees		$ 72.90
Research Fund:		
Balance, April 1, 1949	$60,834.03	
Deduct: Excess of Expenses over Income for the year ended March 31, 1950, per attached statement	10,101.45	
Balance, March 31, 1950		50,732.58
Total Liability and Fund		$50,805.48

STATEMENT OF INCOME AND EXPENSES FOR THE YEAR ENDED MARCH 31, 1950

INCOME		
Sustaining Membership Dues and Subscriptions	$27,799.50	
Sale of Reprints	924.99	
Interest on Savings Fund Accounts	964.63	
Interest on U. S. Treasury Bond	50.00	
Total Income		$27,739.12
EXPENSES		
Salaries of Project Directors and Associates	$25,509.29	
Project Payments to Institutions	8,210.00	
Cost of Reprints	1,374.13	
Supplies	1,406.73	
Legal Expense	60.00	
Office Expense	43.79	
Per Capita Tax, Sustaining Members Paid to General Fund	1,048.10	
Travel Expenses	417.93	
Miscellaneous Expense	1,763.54	
Uncollectible Accounts	7.06	
Total Expenses		39,840.57
Excess of Expenses over Income		$10,101.45

committee's hands by June, with publication probably before the end of the summer. On the basis of this schedule, experimental work on the physical properties of electrodeposited copper should be well under way by the end of the year.

Project No. 10, "Disposal of Plating Room Wastes", hurdled some major obstacles during the past year. The most vexing of these was the lack of suitably accurate analytical procedures for moderate to very small amounts of cyanide. Present and pending legislation refers glibly to cyanide limits of 1 ppm or even less, a range for which no accurate analytical method was available. Furthermore, these low probable regulatory limits require that the researches which are planned utilize analytical procedures capable of determining accurately even smaller amounts. This problem has now been solved as a result of the direct cooperation by Project No. 2, "The Determination of Impurities in Electroplating Solutions". The new methods are adequately accurate but could desirably be simpler and quicker. They will be published soon under the joint sponsorship of Projects Nos. 2 and 10.

Experimental work on the destruction of cyanide is now proceeding rapidly, with first priority being accorded the oxidation of cyanide by hypochlorites, a procedure which appears to be quite promising for batch (single-tank) as well as for continuous or collected-batch treatment.

In recognition of the growing urgency of the waste disposal problem, more than 20 per cent of the available research funds are being utilized on this project. It would be desirable to accelerate this work even more if funds could be made available.

Project No. 11, "Current and Metal Distribution in Electroplating", completed all the experimental work on deposit distribution in an acid copper bath and began work on the deposit distribution in nickel baths. It should be remembered that the acid copper bath was investigated first because in it metal and current distributions are substantially equal. The copper publication contains a total of 80 graphs and covers an adequate assortment of angles and radii including a true right angle.

Project No. 12, "The Cleaning and Preparation of Metals for Electroplating", began actual operation in October, 1949 and virtually completed a bibliography and critical review of that part of the literature concerned with means for evaluating the effectiveness of a cleaning process. Experimentally, a method was developed for uniformly soiling metal samples, a necessary adjunct to any subsequent experimentation. At an early date a statement will be published which will clarify the goal of this project and at the same time outline the method of attack selected.

RESEARCH COMMITTEE 1949-1950

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L. E. Weeg, *Vice-Chairman*
National Lock Company

B. C. Case
Hanson-Van Winkle-Munning Company

G. M. Cole
Ternstedt Div., General Motors Corp.

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H. J. Struckhoff
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Dr. W. A. Wesley
The International Nickel Company

Dr. William Blum, *Honorary Member*
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Representing Electrochemical Society
Swarthmore College

C. H. Sample
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The International Nickel Company

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D. R. Robson, *Vice-Chairman*
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Dr. W. A. Wesley, *Vice-Chairman*
The International Nickel Company

Dr. R. M. Wick, *Vice-Chairman*
Bethlehem Steel Company

RESEARCH PROJECTS

Project No.	Title	Location	Project Director	Project Directing Committee	Year Accepted
2	*"Determination of Impurities in Electroplating Solutions"*	Lehigh University	Prof. E. J. Serfass 1 Assistant	Dr. D. G. Foulke, Chairman; Hanson-Van Winkle-Munning Co. Dr. W. R. Meyer, Enthone, Inc. R. A. Ehrhardt, Bell Telephone Labs.	1944
4	*"Effect of Surface Finishing of Non-Ferrous Base Metals on Protective Value of Plated Coatings"*			M. R. Diggin, Chairman; Hanson-Van Winkle-Munning Co. E. A. Anderson, New Jersey Zinc Co. A. W. Tracy, The American Brass Co.	1947
5	*"Effects of Impurities and Purification of Electroplating Solutions"*	Michigan State College	Prof. D. T. Ewing 2 Assistants	G. M. Cole, Chairman; Ternstedt Div., General Motors Corp. L. B. Sperry, Doehler-Jarvis Corp. L. C. Borchart, Houdaille-Hershey Corp. Dr. J. E. Stareck, United Chromium, Inc.	1945

(Continued on page 660)

Project No.	Title	Location	Project Director	Project Directing Committee	Year Accepted
6	*"The Nature and Effect of Porosity in Electrodeposits"*	Princeton University	Dr. N. Thon 2 Assistants	Dr. W. A. Wesley, Chairman; International Nickel Co Dr. B. Egeberg, International Silver Co. A. Mendizza, Bell Telephone Labs. C. Struyk, General Chemical Div., Allied Chemical & Dye Corp.	1946
7	*"Methods for Testin Thickness of Electrodeposits"*	Pennsylvania State College	Prof. H. J. Reed 1 Assistant	G. W. Jernstedt, Chairman; Westinghouse Electric Corp. A. H. DuRose, Harshaw Chemical Co. G. B. Bowman, Standard Steel Spring Co.	1946
9	*"Physical Properties o Electrodeposited Metals"*	National Bureau of Standards	Dr. A. Brenner 1 Amistant	Dr. W. Blum, Chairman; National Bureau of Standards C. H. Sample, International Nickel Co. N. Promisel, Bureau of Aeronautics, Navy Department	1947
10	*"The Disposal of Plating Room Wastes"*	Yale University	Prof. B. F. Dodge 2 Assistants	H. B. Smith, Chairman; R. Wallace & Sons Mfg. Co. F. J. Holt, E. I. du Pont de Nemours & Co. M. A. Orr, International Silver Co. Dr. C. F. Gurnham, Consulting Member; Tufts College	1947
11	*"Current and Metal Distribution in Electroplating"*	Evansville College	Prof. J. Kronshein 1 Assistant	Dr. R. A. Schaefer, Chairman; Cleveland Graphite Bronze Co. Dr. H. J. Wiesner, Bendix Products Div., Bendix Aviation Corp. L. E. Weeg, National Lock Co.	1948
12	*"Cleaning and Preparation of Metals for Electroplating"*	Columbia University	Prof. H. B. Linford 1 Assistant	Dr. H. Bandes, Chairman; Sylvania Electric Prods., Inc. Dr. D. Price, Oakite, Inc. Dr. E. A. Parker, Technic, Inc.	1948

New projects received more attention last year than has been the case for several years. A specific project was desired for a tentative Canadian project. This problem received much study and culminated in the offering to the Canadian group of a project representing a division out of Project No. 5, specifically the problem of removing trace contaminants from plating baths. In addition, a New Projects Subcommittee tendered a long list of projects for consideration by the Committee. These projects are to be classed by the committeemen as (1) possible A. E. S. Research projects and (2) sponsored but not financially subsidized projects for use by universities and others desiring research-subject suggestions.

Publications

In the year from March, 1949 to February, 1950 inclusive, a total of ten papers appeared in twelve issues of PLATING. These publications, which amounted to seventy full printed pages, were distributed by project as follows: Project No. 2—six papers; Project No. 6—two papers, and Projects Nos. 5 and 10—one paper each. In addition the editor has two papers for publication, the committee has three papers in hand, and project committees have six under immediate consideration, thus guaranteeing a steady flow of publications in the ensuing year. The papers already available or nearly so promise a broader representation next year, a desirable factor both for the committee as well as PLATING.

Finances

The Research Committee's financial position has both encouraging and discouraging features. The most significant and disturbing fact has been the excess of expenditures over income. It has been the opinion of the Committee, however, that an operating loss, i. e., withdrawal from reserve, was justifiable when the value of the research was sufficiently high, and hence it authorized specifically an acceleration of the rate of progress on the waste disposal study and initiation of work on the cleaning project. The alternative, to operate within current income, would have entailed definite retrenchment at a time when the results of researches were closer than ever before.

The drop in income during the year was slight when it is considered that numerous concerns felt the summer and fall recession to a significant degree. The net loss in sustaining memberships for the year was three.

Again the income from the American Electroplaters' Society membership was far below the one dollar per capita proposed as a minimum. It is evident by now that this situation can be rectified by constitutional amendment only. New means and techniques for selling of sustaining memberships through intensive local effort are currently under trial in both the Detroit and Chicago areas. These operations, essentially well organized Branch campaigns, will ultimately be modified by experience and applied on a National scale where the concentration of interested industry will justify.

Publicity goals and approaches have changed considerably. The slide film, "Lot's Wife", was placed in the hands of all Branches. Stuffer literature is being revised and materially altered. Testimonial approaches are being explored, particularly in the Detroit area campaign. It is evident that our publicity and sales effort must reach management rather than the plater or plating supervisor. New means for making these high-level contacts are being explored. Active cooperation and sponsorship by management-recognized agencies are being solicited.

Organization

Certain inadequacies in organization became increasingly apparent during last year's operations, and as a result it was decided to combine the solicitation of funds and the publicity functions in what was the Finance Subcommittee and to change the title of this subcommittee to the Finance and Publicity Subcommittee. As at present the chairman of this subcommittee will be a senior member of the Research Committee. He will appoint properly qualified vice-chairmen to direct the functions of sustaining-membership

solicitation and publicity. These vice-chairmen need not be Research Committee members when selected; however, they will constitute highly qualified material for subsequent Committee appointment.

The growing impossibility of adequately discussing the major operations of the Committee—procurement of funds, publicity, and research—in a seven-hour meeting held each quarter worried both the Executive Board and the Research Committee. A two-day meeting is impractical because the members serve through the courtesy of their employers. It was decided to adopt an alternative procedure, namely, to divide the Research Committee into two groups for detailed discussion of individual problems and to combine the groups only for a relatively short joint session so that the Committee can act constitutionally on proposals requiring official action.

Liaison

Close liaison continued with A. S. T. M. Committee B-8 on Electrodeposited Metallic Coatings and will be established with A. S. T. M. Committee D-19 on Industrial Waste. Token liaison existed with the Electrochemical Society. Possibly a similar association will be established with the American Institute of Metallurgical Engineers. Project No. 10 by nature maintains close contacts with several State and Federal agencies.

Acknowledgment

The committee wishes to thank those whose contributions in both money and time have made possible the past year's progress.

W. M. Tucker

SUSTAINING MEMBERSHIP LIST

(Figures in parenthesis indicate number of memberships held)

Acme Plating Company, The
Acme Steel Company
Advance Plating Company, The
Alsop Engineering Corporation
Aluminum Company of America
American Brass Company
American Buff Company
American Can Company
American Chemical Paint Company
American Hot Dip Galvanizer's Association, Inc.
American Instrument Company
American Radiator and Standard Sanitary Corporation
American Smelting & Refining Company
American Wire Fabrics Corporation
American Zinc Institute (5)
Apex Plating Company
Apollo Metal Works
Apothecaries Hall Company
Ardco, Incorporated
Armco Steel Corporation
Arrow-Hart & Hegeman Electric Company
Arrow Plating Company, Inc.
Auto City Plating Company
Automotive Rubber Company
Azed, Inc.
Bastian-Blessing Company, The
Belke Manufacturing Company
Bell Telephone Laboratories, Inc.
Bendix Products Division, Bendix Aviation Corporation
Berteau-Lowell Plating Works
Bethlehem Steel Company (2)
Blakeslee, G. S. & Company
Briggs Manufacturing Company
Buckingham Products Company (2)
Canadian Hanson & Van Winkle Company, Limited
Casco Products Corporation
Chase Brass & Copper Company
Chemical Corporation, The
Chicago Electro-Platers Institute
Christie Plating Company
Chrome-Rite Company (2)
Chromium Corporation of America
Chromium Process Company, The
Chrysler Corporation (2)
Cinch Manufacturing Corporation
Cleveland Graphite Bronze Company, The
Clinton Company, The
Codman, F. L. & J. C., Company
Corona Corporation
Cowles Chemical Company
Crane Company
Croname, Incorporated
Crown City Plating Company
Crown Cork and Seal Company
Crown Rheostat and Supply Company
Darco Corporation
Davies Supply & Manufacturing Company
Daystrom Corporation
Detrex Corporation
Detroit Plating Industries
Diversey Corporation, The
Dixie Electro Plating Company
Doehler-Jarvis Corporation (2)
R. R. Donnelley & Sons Company
E. I. duPont de Nemours & Company
Dura Div., Detroit Harvester Company
Dura-Chrome of Chicago, Inc.
Eastman Kodak Company (2)
Eaton Manufacturing Company
Electric Auto-Lite Company, The (2)
Electrolux Corporation
Ellmore Silver Company, Inc.
Enthone, Inc.
Erie Plating Company
John H. Feeley
Finishing Publications, Inc.
Ford Motor Company (5)
Formax Manufacturing Company
Frigidaire Division, General Motors Corporation
Gemex Company
General Electric Company
General Motors Corporation (5)
Gerity-Michigan Corporation
Gillette Safety Razor Company
Gorham Manufacturing Company
Graham, Crowley & Associates, Inc.
Graham Plating Works
Grand Plating Company
Great Lakes Industries, Inc.
W. Green Electric Company, Inc.
Frederick Gumm Chemical Company
Hall-Mack Company
Hamilton Watch Company
Hammond Machinery Builders, Inc.
Hanson-Van Winkle-Munning Co. (3)
Harshaw Chemical Company, The (3)
Haviland Products Company
Heil Process Equipment Corporation
Houdaille-Hershey Corporation (3)
Howard Plating Industries, Inc.
Hub Plating Works
Hudson Motor Car Company
Hy-Grade Plating Company
Illinois Watch Case Company
Industrial Filter & Pump Manufacturing Company
International Business Machines Corporation
International Nickel Co., Inc., The (5)
International Silver Company
Jones & Laughlin Steel Corporation
Keeler Brass Company
Kelite Products, Inc.
Kelly Plating Company, The
Knape & Vogt Manufacturing Company
Knight-Morley Corporation
Knight Plating Company
Kocour Company
Kohler Company
Kuehne Manufacturing Company
Lasalco, Inc.
Lea Manufacturing Company, The
Lea Manufacturing Company of Canada, Ltd.
Leeds & Northrup Company
Chas. F. L'Hommedieu & Sons Company
Lyon Incorporated
Maas & Waldstein Company
W. D. MacDermid Chemical Company
MacDermid, Incorporated
Magnuson Products Corporation
R. C. Mahoney
Manderscheid Company, The
Matchless Metal Polish Company, The
Mattatuck Manufacturing Company
Maurer Supply Company
McGean Chemical Company, The
Meaker Company, The
Mechanical Plating Company
Mercil Plating Equipment Company
B. Mercil & Sons Plating Company
Metal Finishers, Inc.
Metal Finishing Association of Southern California, Inc.
Metal Mouldings Corporation
J. C. Miller Company
Mitchell-Bradford Chemical Co., The
Modern Plating Company, The
Moore Drop Forging Company
Motor Products Corporation
Mutual Chemical Company of America
George L. Nankervis Company
National Aniline Division, Allied Chemical and Dye Corporation
National Brass Company
National Cash Register Company, The

National Lock Company
National Plating Company, Inc., The
National Screw and Manufacturing Company, The
Nelson Chemicals Corporation
New England Buff Company
New England Plating Company
New Jersey Zinc Company (3)
George E. Nichols Plating
G. J. Nickolas & Company
Noblitt-Sparks Industries, Inc.
Northwest Chemical Company (2)
Nutmeg Chrome Corporation
Oakite Products, Inc. (2)
Oneida, Ltd.
Packard Motor Car Company
Parker Rust Proof Company
Pennsylvania Salt Manufacturing Company, The
Pheoll Manufacturing Company
Platers Supply Company
Plating Products Company, The
Price-Pfister Brass Manufacturing Company
Products Finishing
R. C. A. Victor Division, Radio Corporation of America
R. W. Renton & Company
Reynolds-Robson Supply Company (2)
Roberts Rouge Company
G. S. Robins & Company
Roto-Finish Company
Royal Plating and Polishing Company
Scientific Control Laboratories
Scoville Manufacturing Company
E. E. Seeley Company, Inc.
Seymour Manufacturing Company, The
J. J. Siefen Company
Standard Plating Rack Company
Standard Plating Works
Standard Steel Spring Company (3)
Stanley Works, The
Frederic B. Stevens, Inc. (2)
Studebaker Corporation, The
George A. Stutz Manufacturing Company
Superior Steel Corporation
Sylvania Electric Products, Inc.
Talon, Inc.
Thomas & Son Company, The
Thomas Steel Company, The
Trico Products Corporation
Turco Products, Inc.
Udylite Corporation, The (3)
United-Carr Fastener Corporation
United Chromium, Inc. (2)
United Manufacturing Company
United Platers, Inc.
United States Spring & Bumper Company
Van Der Horst Corporation of America
A. T. Wagner Company
Wagner Brothers
Wald Manufacturing Company
R. Wallace & Sons Manufacturing Company
Walton & Lonsbury
Warner Electric Company
Waterbury Companies, Inc.
Waterbury Plating Company
Weirton Steel Company
W. W. Wells, Limited
Western Electric Company
Western Rustproof Company
Westinghouse Electric Corporation
Wheeler Industries, Inc.
Winchester Repeating Arms Company
Winters & Crampton Corporation
Wollensak Optical Company
Worcester Brass Electro Plating Company
Wyandotte Chemicals Corporation
Yankee Metal Products Corporation

RESEARCH COMMITTEE SUBSCRIPTIONS

BRANCH CONTRIBUTIONS

Bridgeport	$ 52.50
Chicago	600.00
Columbus	109.00
Grand Rapids	186.00
Los Angeles	100.00
Philadelphia	200.00
Pittsburgh	125.00
Providence-Attleboro	108.00
St. Joseph Valley	69.00

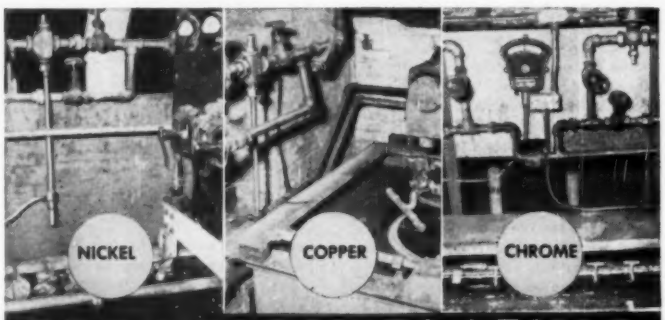
OTHER CONTRIBUTIONS

American Society for Testing Materials	250.00
Detroit Edison Company, The	100.00
P. R. Mallory & Co., Inc.	100.00
Proctor Electric Co.	50.00

PUBLIC RELATIONS COMMITTEE CHAIRMAN'S REPORT

Phillip

A number of meetings of this Committee was held during the year. Perhaps the most important decision made was to hire a writer who might be capable of



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With 3 Sarco Temperature Controls

Any plating engineer knows exactly what he wants in temperatures for the various jobs going through his plant. Few realize that the very controls he needs are waiting for him and can be installed quickly at comparatively little cost.

Starting with the wash tanks he can get a suitable control in the Sarco 87 Thermoton for the cost of a good steam trap.

For greater refinements in control the Sarco TR-22 illustrated and the Sarco TR-21 control are available. For chrome he can add automatic cooling at little cost.

For most plating jobs he can keep temperatures within a degree or two with the inexpensive Sarco LSI Electric Controls.

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producing copy of sufficient human interest to merit publication by newspapers, periodicals, or magazines. The main reason for this decision was that the amount of money in our treasury was insufficient to warrant a paid-advertising campaign.

We were fortunate in obtaining the services of Mr. S. E. Sangster on a part-time basis. His most recent report, shown here as Appendix I, gives a good idea of what has been accomplished and what we have in mind. It is your Chairman's recommendation that Mr. Sangster's services be continued, if this is in line with the thought of the Committee as constituted following this Annual Meeting.

Mr. Sangster has made some suggestions which I consider to have merit. They are reproduced here in condensed form as Appendix II for the consideration of the Committee and the Society.

The activities of this Committee are being financed from the profits of the two Industrial Finishing Expositions held in 1947 and 1948. The amount spent this year was higher than that originally suggested by the Executive Board. This activity, if carried on, will require adequate financial support, and I would suggest that an appropriation of not less than $10,000.00 be set aside for next year's activities. Appendix III lists the expenditures during the past year.

I submit this report for the approval of the Committee and the Society.

W. M. PHILLIPS

APPENDIX I

THE PUBLIC RELATIONS PROGRAM

The following constitutes the status of our public relations program as of February 11, 1950:

Already published are the following:

1. Feature article, "Evolution of the Bumper", in the February issue of Motor News—circulation 250,000.
2. Article, "Uses of Electroplating—one page with two pix—in Steel magazine, January 23 issue, page 78.
3. Article (condensed), "Plating Protects Vehicles", in Automotive News, February 6 issue, page 28, with one pix.
4. Feature article, "How Your Knives and Forks Are Made", in November issue of Popular Science, pages 171–176, with 16 pix.

Placed for publication and believed accepted for early appearance in Popular Science magazine is a feature article, "The Story of the Tin Can", with some 12 pix.

Also placed and accepted is a feature on "Plating in the Auto Industry", with facts and statistics, in a forthcoming number of Products Finishing and in the special "Michigan Industry" issue (May) of the Michigan Manufacturer.

We have yet to place successfully two picture stories prepared in November; one on the making of electrotype plates and the other on gravure printing, which embody two major applications of electroplating in the graphic-arts industry. At this time the electrotype story, carrying seven pix, with captions and a two-page manuscript, is in the hands of Popular Mechanics' eastern editor for consideration. The gravure set of seven prints, captioned, and with manuscript will be submitted elsewhere during the next week.

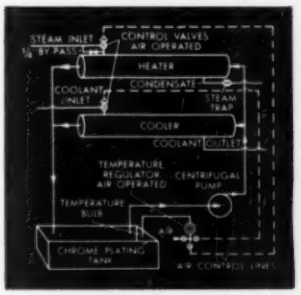
A roto pix layout, with short manuscript and fully captioned set of 12 pix, on the "Story of the Electro Tinplate Can from Plating the Strip Steel to Labelled Food Cans" is ready to be submitted to the Metropolitan Group of 40 newspapers for consideration for their rotogravure sections but has been held up pending receipt of a key pix. This story and pix cover the same subject as that in the hands of Popular Science. Outcome rests with Metropolitan Group Editor in New York office.

Scheduled for preparation is an article, with pix, on "The Romance of the Costume Jewelry Industry". This has been seriously delayed because of our seeming inability to obtain statistical and factual data and proper illustrating pix, including some "action" shots of plating operations in the manufacturing of costume jewery items. Our correspondence continues with the manufacturers in the eastern states and the Jewelry Council, and I am hopeful of having some of the necessary data by the end of February. This subject lends itself to press and publication use as being definitely "cheesecake" in its illustration.

As we have moved along in our efforts to develop a planned program of editorial public relations, the conviction grows that it is of primary importance to develop a flow of press releases, including as a major attempt short "fillers" that spotlight electroplating facts and contain the necessary element of "industrial news interest". To that end we must find sources for such basic facts as, for example, new

MEMO { On a better way to handle chrome plating solutions

With this "outside heater" setup you can put all the advantages of the new Durco heat exchanger to work for you:



A sketch of a typical chrome plating installation showing use of Durco Heat Exchangers.

1. CORROSION RESISTANCE – Made of Duriron. Completely resistant to practically all plating solutions. Years of successful application throughout the plating industry.
2. NO DILUTION of solution.
3. EXCEPTIONALLY HIGH K VALUES obtained by a design that fully utilizes the pressure drop to break down fluid film.
4. COMPLETE FLEXIBILITY OF INSTALLATION. Can be installed horizontally, vertically, near ceiling, on next floor or in next room.
5. NO PACKING AGAINST THE CORROSIVE SOLUTION.
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Complete heat exchanger units including pump, pipe, fittings and valves mounted on single frame, are available.

For details, send coupon.

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Gentlemen:
Please send me, without obligation, your bulletin 1403A on Durco heat exchangers for plating applications.

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plating applications or techniques that reduce costs, or statistics on impressive operations, etc. We are therefore setting up a newspaper mailing list and have contracted with the Romeike Clipping Service to get such a press program under way.

We have moved to interest Fortune magazine in preparing a story of the progress in the electroplating industry and its importance in industrial fields. Before we can make any real progress in that effort, it is essential that we arrive at some overall picture of what the plating industry in the Nation means in dollars and cents, the amount invested in plants and equipment, the supply houses' contribution, the number of persons whose livelihood is made in plating activities, etc. We also hope to arrange to have the part that electroplating plays in the production of today's automobile covered in reference and by illustration in a contemplated overall story of the auto industry in Life magazine.

Badly needed to help in getting the overall picture and for sectional publication and press-material preparation are statistics and outlines of plating application in such fields as communication, aviation, plumbing, surgical and dental instruments, metal furniture, household electrical appliances, etc. So far we have been unable to get any satisfactory response from the sources we have contacted. Except for the telephone industry we must seek to make other contacts.

We have been in touch with the National Association of Metal Finishers and are endeavoring to cooperate with this body in meeting our mutual public-relations needs.

Two fields that appear to possess potentiality for press and publication publicity are: (a) The Plating of Plastic Products, and (b) The Plating of Aluminum. These we have in mind for development as and when they can be covered.

S. E. SANGSTER

EVERYTHING YOU NEED IN A RACK COATING!

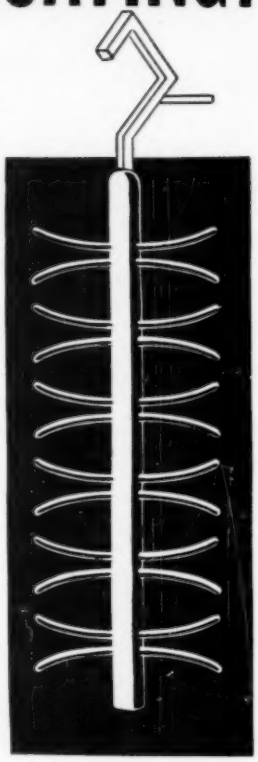
Unichrome Coating 218X—a plastisol—provides this top combination of properties needed for real service:

You get the ideal rack protection in Coating 218X. For (1) It resists abrasion and impact—so Coating 218X is not prone to mechanical damage! (2) It stands up in acids, and hot alkaline solutions, and even *degreasers*—so you can work it through *any* plating cycle! (3) This coating is easy to apply and has unusual adhesion! (4) To cap it all, a United Chromium Service Engineer gives you any technical help you require to do a top quality coating job.

No wonder Unichrome Coating 218X rates "EXCELLENT" in the report of a leading automotive producer. Another company is covering every chromium plating rack in the plant with it. A third user affirms never having a coating able to take rough handling and hundreds of vapor degreasing cycles like this plastisol! So it goes in hundreds of plants—longer service, lower costs.

You too can be sure of satisfactory applications. Get acquainted with "218X"—you'll profit by it. Write for more data.

Nearby applicators can do the coating job for you if you have no baking oven. Ask for names.



UNICHROME

Trade Mark

Coatings for Metals

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APPENDIX II

NEW APPROACHES IN THE PUBLIC RELATIONS PROGRAM

There seems no reason to doubt that to obtain the basic facts essential for building a general program of press and publication publicity, aimed at educating the general consuming public in the progress of electroplating and its contribution to its standards of living, we must establish a source of such data in the industries involved.

It is my suggestion that the Society address the proper public-relations director of each industry and endeavor to have him cooperate (1) in digging out the kind of "news" facts of new plating applications (including specific applications interesting from the standpoint of producing more efficient products or services) which will serve as "pegs" on which we can develop press releases and build up magazine material and (2) in obtaining proper close-up "action" pix. At the same time it would seem likely to further our objectives if the public relations of these larger industries, in which electroplating is a major factor, can be induced to give such plating applications mention in their own publicity covering new models, new products, etc. Included among such industries are the segments comprising the communications field (telephone, radio, radar, etc.), aviation, automobile, metal furniture, camera, surgical instruments, firearms, etc. By so doing, our own program would be augmented and strengthened.

It would greatly aid in attaining the broad objectives of the public-relations program if the editorial activity could be supported by one of radio briefs that would, with an institutional approach, spotlight some important electroplating application that makes for better products, products that not merely are more attractive because of exterior chromium or other decorative applications but outstanding because of unseen applications of "engineering" plating. The development of such radio publicity requires, of course, necessary funds.

S. E. SANGSTER

APPENDIX III

PUBLIC RELATIONS COMMITTEE EXPENDITURES

July 15, 1949 to March 14, 1950

S. E. Sangster's services	$1,800.00
Miscellaneous expenses by S. E. Sangster	117.03
Photographic services	183.84
Services of model—17 pictures	8.00
Stationery and printing	11.26
Romeike press clippings (January 9 to March 9, 1950)	20.00
Total	$2,140.13

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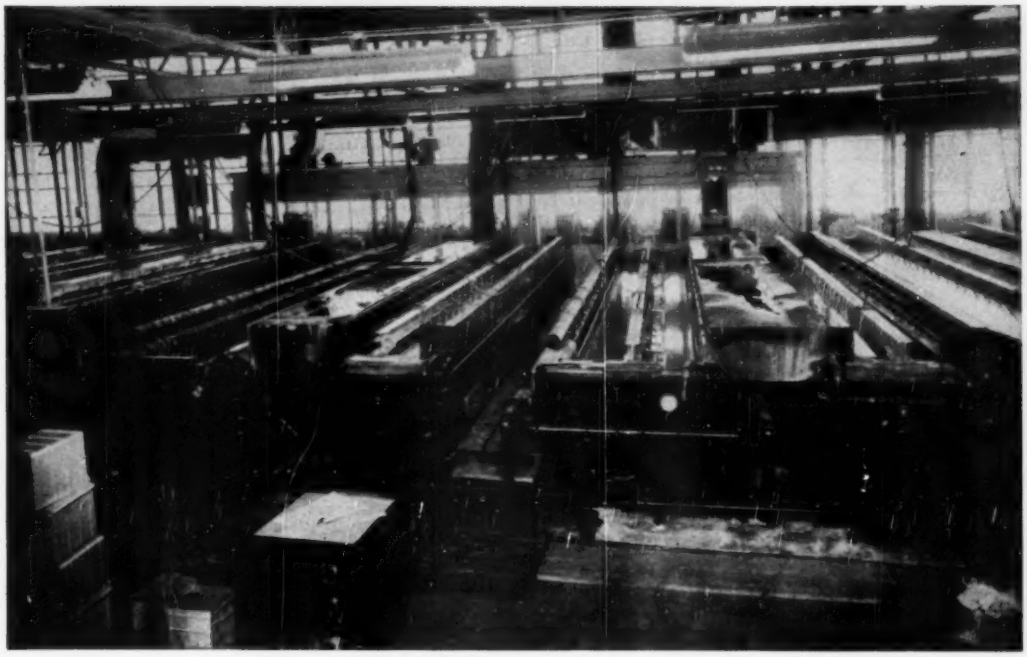
During **METAL FINISHING!**



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Patent Abstracts

GEORGE B. HOGABOOM
Consultant, New Britain, Conn.

Copies of patents may be obtained by writing to Commissioner of Patents, Washington 25, D.C. Price 25 cents each.

No. 2,500,206, March 14, 1950—Apparatus for Plating —R. A. Schaefer, J. B. Mohler and H. Pochapsky, assignors to Cleveland Graphite Bronze Company, Cleveland, Ohio.

Specifically the invention relates to the electrodeposition of a layer of metal onto a plurality of semicylindrical metal articles and to the maintenance during the plating operation of a uniform thickness, both axially throughout the column of stacked articles and axially from lateral edge to lateral edge of each cylindrical article. The term "lateral edge" employed above denotes the straight parallel edges of the semicylindrical object, the inner, or concave, surface of which is to be plated. The term "uniform" used above and used herein denotes that degree of uniformity in which no portion of the electrodeposit layer departs from the average by more than 5 per cent in thickness.

The rack was provided with a hook for suspension in a plating bath, and the assembly was processed through the precleaning and etching solutions and was then suspended vertically in a bath consisting of:

	Grams per liter
Lead	100–110
Hydrofluoboric acid	40–50
Total tin	8–12
Resorcinol	1–5
Gelatin, minimum	0.1
Copper	1–3

The anodes were composed of 10 per cent tin, balance lead, and placed around the periphery of the plating tank in a vertical position but in no particular relationship with the rack. The copper is added in the form of soluble salts. The rack remained in the electrolyte for approximately 21 minutes with a current density of 20 amperes per square foot and between 4 and 6 volts.

CLAIM 1. A plating device comprising an elongated box of insulating material adapted to receive a series of semicylindrical articles to be plated, mounted in registering, edgewise relation and having the inner aligned surfaces thereof facing toward one wall of said box, said box being provided with a longitudinal slot extending for a distance in the wall in which it is formed substantially equal to the aggregate length of the registering semicylindrical articles mounted in said box and such slot being disposed parallel to the axis

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of said articles and having a width of substantially 22 to 38 per cent of the diameter of each of said articles, said articles being arranged symmetrically with respect to such slot, and the wall of said box having inwardly projecting lips at each side of such slot with the inward projections of such lips being approximately 3 to 4 per cent of the diameter of said articles and the width of such lips being approximately 6 to 10 per cent of the diameter of said articles in such position and their edges against the inner face of said wall of said box having the slot therein and with the articles in close contact edgewise with each other, a removable member constituting the wall of said box opposite to that wall provided with such slot, said removable member when in position being adapted to substantially seal the box electrically except for such slot, and the current-conducting means passing through said box and engaging one of said members to be plated.

3 claims, 8 figures.

References cited: U. S. Patents 1,519,572; 1,872,221; 2,073,679; 2,316,609; 2,362,228; 2,434,417.

No. 2,503,217, April 4, 1950—Process for Treating Brightened Electrotinplate—A. F. Prust, assignor to Republic Steel Company.

CLAIM 4. The method of treating brightened electrotinplate which comprises the steps of removing oxide from surfaces of such tinplate by making the tinplate cathode in an aqueous electrolyte containing dissolved hexavalent chromium ions equivalent to those in from .5 to .75 per cent by weight of alkali chromate and passing an electric current from about 4 to about 25 amperes per sq.ft through said electrolyte and tinplate for between about one second and about ten seconds, removing electrolyte from the tin surfaces by passing the tinplate in a steam atmosphere into and out of a body of water, removing water from said surfaces by directing jets of steam under pressure at an acute angle thereagainst, drying the tin surfaces by heating them for less than one second, and immediately protecting the tin surfaces against contact with air by covering them with an adherent oil emulsion film and removing moisture from said film.

5 claims, 1 figure.

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8411 Hegerman Street Philadelphia 36, Penna.

References cited: U. S. Patents 1,827,204; 1,872,614; 2,125,387; 2,142,486; 2,203,062; 2,215,143; 2,215,165; 2,234,593, 2,255,859; 2,266,330; 2,274,963; 2,306,143; 2,314,818; 2,317,242; 2,327,127; 2,327,885; 2,424,718. British Patent 479,746.

No. 2,503,234, April 11, 1950—Method of Making Electrolytic Iron—J. R. Cain, assignor to Sulphide Ore Processing Company, Inc., New York, N. Y.

CLAIM 1. Method of making electrolytic iron, comprising the steps of subjecting an electrolyte containing ferrous and ferric chlorides to electrolysis between an insoluble anode in the anolyte, which has a *p*H value below 2.0 and contains ferrous and ferric chlorides in proportions of from 100 to 2 to 100 to 30, and is separated from the catholyte, which contains ferrous and ferric chlorides in proportions of from 100 to 0.1 to 100 to 2.0, withdrawing a portion of the anolyte, leaching an ore characterized by containing iron sulfide in pyrrhotitic form therewith, said ore being always in excess with respect to the solvent leach liquor thereby to dissolve the iron of the iron sulfide as ferrous chloride and to reduce the ferric chloride of the solution to ferrous chloride until the proportion of ferrous and ferric chlorides is between 100 to 2 and 100 to 0.5, then heating to the boiling point to remove any copper which may be in solution, separating the resulting solution from residual solids and undissolved iron sulfide, and delivering the same into the catholyte.

1 claim, 2 figures.

References cited: U. S. Patents 992,951; 1,751,099; 1,761,641; 1,912,430; 1,945,107; 1,980,381; 2,223,928; 2,273,036. British Patent 549,954.

No. 2,503,235, April 11, 1950—Method of Electrodeposition of Iron—J. R. Cain, assignor to Sulphide Ore Process Company, Inc., New York, N. Y.

CLAIM. Method of electrodeposition of iron from a non-diaphragm cell using an insoluble anode, comprising passing an electric current through an aqueous electrolyte solution consisting essentially of ferrous chloride, maintaining the electrolyte in the ratio of 100 parts ferrous iron as ferrous chloride to 1 to 3 parts ferric iron as ferric chloride with free hydrochloric

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acid in amount not to raise the *p*H above *p*H 2, continuously withdrawing the electrolyte from the cell containing it with pyrrhotitic ore to reduce the concentration of ferric iron to 0.1 to 1 per cent of the total iron concentration of the electrolyte and increasing the concentration of ferrous chloride, filtering the leach liquor and continuously returning same containing the increased concentration of ferrous chloride, the decreased concentration of ferric chloride and with substantially the same hydrochloric acid concentration and *p*H value to the cell, the circulation of the electrolyte being at a rate to maintain the above described concentration thereof substantially constant.

1 claim, 1 figure.

References cited: U. S. Patents 1,162,150; 1,782,909; 1,862,745; 1,912,430; 1,945,107; 1,980,381; 2,223,928; 2,273,036; 2,464,889. British Patent 549,954.

No. 2,504,272, April 18, 1950—Electrodeposition of Silver—Ewald H. McCoy.

An object of the invention is to provide for electrodeposition of silver from a bath in which the silver-ion concentration is maintained at a low value while at the same time a large quantity of silver is maintained in the solution in the form of complex ions and is readily available for conversion to free silver ions as the silver ions are used in the electroplating. Another object is to provide an electrodeposit of silver in which a mat surface is produced and in which deposits of desired ductility are obtained. A further object is to provide for the electrodeposition of silver by a process which possesses high electrical efficiency. Yet another object is to provide for electrodeposition of silver on metals and also on conducting surfaces of electrically nonconducting materials, and particularly to provide for satisfactory adhesion of the electrodeposit of silver to the conducting surface of a nonconducting material. A further object is to provide for the electrodeposition of silver upon aluminum or magnesium and for a bath, or solution, which itself does not attack the aluminum or magnesium which is to be plated.

Another object is a bath, or solution, for the electrodeposition of silver which avoids the disadvantages of the highly poisonous characteristics of cyanide baths.

USE READER SERVICE CARD; INDICATE A 495.

EXAMPLE I

Silver nitrate, g/l	30–47.5
Sodium pyrophosphate, $Na_4P_2O_7$. $10\ H_2O$, g/l	20–40
Ammonium sulfate, g/l	80
Ammonium hydroxide (sp. gr. 0.90), ml/l	40
*p*H	Approx. 9.0

EXAMPLE II

Silver pyrophosphate, g	26–42
Ammonium sulfate, g	120
Ammonium hydroxide (sp. gr. 0.90), ml	40
Sodium pyrophosphate, g	20
Water, l	1
*p*H	9.0

EXAMPLE III

Silver sulfate, g	28–45
Sodium pyrophosphate, g	20–40
Ammonium sulfate, g	70
Ammonium hydroxide (sp. gr. 0.90), ml	40
Water, l	1
*p*H	9.0

CLAIM 1. A process for the electrodeposition of silver consisting of introducing the material to be plated into an aqueous solution consisting of between 2 and 5 per cent by weight of silver pyrophosphate, an excess of pyrophosphate ion, in excess of two ammonium ions to each silver ion, and from 4 to 12 per cent by weight of ammonium sulfate, the solution having a *p*H between 8.5 and 9.7, and passing an electrical current through the solution and to the material as the cathode.

References cited: U. S. Patents 744,170; 923,864. Hugh *et al.*, "The Character of Silver Deposits from Various Electrolytes", J. Am. Chem. Soc. **32**, 1571–1576 (December, 1910). Z. anal. Chem. **28**, 592 (1889). Mellor, "Treatise on Inorganic and Theoretical Chemistry", Vol. III (1928), pp. 487–488. Smith, "The Electrolysis of Metallic Phosphates in Acid Solutions", J. Am. Chem. Soc. **12**, 335 (1890).

6–12–50

Dear Mary:

Made Boston this morning. Lunched with Jim (baked beans!) then hopped over to the Convention. Met and thanked Joe Kushner of Stroudsburg, Pa., for E.K.H. He introduced me to lots of other E.K.H. grads—glad to know I'm in such good company! That's all for now, honey—there's a "tea party" in Room 1409! Love to you and the kids,

Bill

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A. E. S. News

Paper Awards

The Paper Awards regulations, published in an appendix to the Constitution and By-Laws of the Society, have now been revised by the Executive Board. In this revision, prepared by Past President S. S. Johnston, valuable and constructive criticism were freely given by Messrs. C. H. Sample, R. A. Schaefer, and E. A. Parker, who ably performed as the Paper Awards Committee in 1948–1949.

1. *Committee on Paper Awards*: No change.

2. *Awards:* The following paper awards may be made:

(a) The A. E. S. Gold Medal with an award of $50.00 for the best paper printed in Society publications during the fiscal year.

(b) The A. E. S. Silver Medal with an award of $25.00 for the second best paper printed in Society publications during the fiscal year.

(c) A Certificate of Honorable Mention with an award of $15.00 for the third best paper printed in Society publications during the fiscal year.

(d) The Mechanical Finishing Award of the American Electroplaters' Society, sponsored by the Lea Manufacturing Company and consisting of $50.00 and a certificate, for the best paper on the subject of mechanical finishing appearing in Society publications during the fiscal year.

(e) The Chromium Plating Award of the American Electroplaters' Society, sponsored by the Nutmeg Chrome Corporation and consisting of $50.00 and a certificate, for the best paper on the subject of chromium plating appearing in Society publications during the fiscal year.

(f) The Gold and Gold Alloy Plating Award of the American Electroplaters' Society, sponsored by Technic, Incorporated and consisting of $50.00 and a certificate, for the best paper on the plating of gold or its alloys appearing in Society publications during the fiscal year.

3. *General Consideration for Awards:*

(a) The author of any paper which merits one or more of the Society's Paper Awards may be any person, not necessarily a member of the Society.

(b) If in the judgment of the Paper Awards Committee those papers whose subject matter makes them eligible for any of the special awards, (d), (e), or (f) above, have insufficient merit to deserve the award, the Committee shall announce that no award of (d), (e), or (f) is made for that year. The decisions of the Committee on Paper Awards shall be final.

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3—1250 AMPERE, 15 VOLT **COLUMBIA ELECTRIC CO.** Exciter-in-Head.

2—1000/500 AMPERE, 6/12 VOLT **CHARLES J. BOGUE ELECTRIC CO.** Separately Excited. Interpole Design. Exciter-in-Head.

1—750 AMPERE, 12 VOLT **CHANDEYSSON ELECTRIC CO.** Synchronous Motor. Exciter-in-Head.

1—1500 AMPERE, 40 VOLT **HANSON-VAN WINKLE-MUNNING** Anodizing Synchronous MG Set. Automatic Controls. Exciter-in-Head.

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CAMBRIDGE, MASS.

(c) In judging a paper for an award, the Committee shall completely disregard the author's affiliation, except that no award shall be given for A. E. S. Research Reports and no member of the Paper Awards Committee shall be eligible for award.

(d) Papers presented before a Branch during one fiscal year but printed in a Society publication during a following fiscal year, shall be classified in the year in which publication occurs. A paper appearing serially in two or more issues shall be judged in that fiscal year in which the final part is published.

(e) Papers which have received prior presentation before other societies or prior publication outside the publications of the A. E. S. shall be considered ineligible for competition. This shall include rewrites of such papers unless the rewrite shall contain new material, in which case the new material shall be eligible for consideration.

4. *Specific Consideration for Award:* The only change is in the number of points assigned to each classification. These shall be:
   (a) 30 points
   (b) 30 points
   (c) 30 points
   (d) 10 points

5. *Announcement of Awards:* The announcement of paper awards shall be made by the Chairman of the Paper Awards Committee at the final business session of the Annual Convention following the close of the fiscal year. Presentation of the awards shall be made during the Annual Dinner, or Banquet, at the Convention, and winners of awards shall be requested in advance to be present.

6. *Report of the Paper Awards Committee:* As soon as possible after the close of the fiscal year, the Chairman shall report to the President of the Society the winners of awards during the fiscal year past. The President shall then instruct the Executive Secretary to prepare the various awards for presentation at the Annual Dinner, or Banquet.

New Research Committee Appointments

Mr. B. C. Case, Chairman of the A.E.S. Research Directing Subcommittee, has announced the following appointments:

Mr. R. A. Ehrhardt, Bell Telephone Laboratories, Inc. Murray Hill, N. J., to Project Committee No. 2 on "Nature and Effect of Porosity of Electrodeposits".

Dr. J. E. Stareck, United Chromium, Inc., Detroit, Mich., to Project Committee No. 5 on "Effect of Impurities and Purification of Electroplating Solutions".

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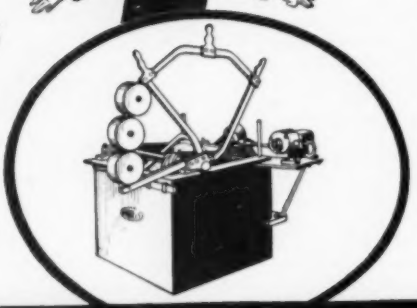

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Branch News

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Golf fees extra, paid directly to the club.

Make your reservations now to avoid disappointment. Facilities are limited.

ADELAIDE BRANCH

The first meeting in 1950 was held in the Engineering Lecture Room of the University, Adelaide on February 15.

MR. W. J. PLATTEN of General Motors Holden, Woodville, South Australia, gave a very instructive lecture on "Bright Nickel Plating Solutions", dealing mainly with control and trouble shooting in the production of the new Australian car, the "Holden". A number of questions followed, which were answered with Mr. Platten's usual thoroughness.

W. FISHER, *Hon. Secretary*

ADELAIDE BRANCH

At the March meeting, the newly elected President, W. J. PLATTEN, introduced the speaker for the evening, MR. W. J. BLANCH, who spoke about "Bright Zinc Plating". Mr. Blanch illustrated his talk by showing a number of samples of bright zinc plate and of chromate finishes. He mentioned the fact that in Australia 99.99 per cent zinc anodes were not available to the plating trade. A question period followed.

W. FISHER, *Hon. Secretary*

ALLENTOWN-READING BRANCH

The regular monthly meeting on March 15 was held in Spurgeons Hotel, Allentown, Pa. The business session, presided over by the Secretary-Treasurer, followed an excellent dinner attended by seventeen members and guests. One man was elected to active membership, another received by transfer from the Newark Branch. Nominations of officers for election on April 19 were made. The following were elected Delegates to the National Convention: NORMAN MILLER, DR. RICHARD WICK, and M. G. MERKLE. RAYMOND HOUSEL, GEORGE WARD, and CARL SWARTZ are alternates.

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HOWARD SCHEARER then took charge of an interesting round-table discussion and question box.

JAMES F. RIEGEL,
Secretary-Treasurer

ALLENTOWN-READING BRANCH

In the absence of the proper officers, HOWARD SCHEARER took charge of the meeting on April 19 following the dinner in Spurgeons Hotel, Allentown, Pa.

The speaker for the evening was MR. JOSEPH B. KUSHNER, Stroudsburg, Pa., whose subject was "Water Control in the Plating Room". He divided water control into quantity control and quality control. Seventy-five per cent of the United States has poor water for the plating industry. Better water can be obtained by deionization or distillation, deionization being the more economical at the present time. Three reasons for the plater to be interested in quantity control are: water conservation (if not done voluntarily, it will without doubt be regulated by law); economics; and easier waste control and treatment. By means of formulas he showed the proper method of setting up rinse tanks so as to use a minimum of water: two rinse tanks in series will give the same quality of rinsing as one tank, with a saving of about 87 per cent in quantity of water.

During the business session three men were elected to active membership. Officers for the fiscal year 1950–1951 were then elected, with the following results:

President—HOWARD E. SCHEARER
First Vice-President—GEORGE W. WARD
Second Vice-President—NORMAN H. MILLER
Secretary-Treasurer—JAMES F. RIEGEL
Librarian—LEE C. WOTRING
Research Chairman—WILLIAM PFEIFFER
Board of Managers—CARL J. SWARTZ, HAROLD FROHWITTER, JOHN MCCURLEY

It was decided that the May meeting would be the last regularly scheduled meeting until next September. A committee was appointed to consider a mid-summer outdoor meeting.

JAMES F. RIEGEL,
Secretary-Treasurer

BALTIMORE-WASHINGTON BRANCH

The regular monthly meeting on April 11 in the Engineers' Club, Baltimore, began with a brief business session during which officers for the 1950–1951 season were elected:

President—RAYMOND STRICKLEN, JR.
Vice-President—GEORGE M. KELLER
Secretary—GEORGE E. BEST
Librarian—VINCEN J. HUGHES, JR.
Treasurer—WILLIAM BRESNICK

LIBRARIAN WALTER OLSON introduced the speaker, MR. J. G. GASKILL of the Baltimore office of the Mine Safety Appliance Company, who described available types of safety equipment, such as masks, respirators, gloves, and protective ointments, and showed where each item of equipment is useful and valuable for the safeguarding of health and safety in the plating room. He also discussed the safe maximum limits of concentration of air contaminants, such as hydrogen cyanide and chromic acid, and showed a simple device for measuring the chromic acid content of air. He closed his presentation with an informative movie entitled "The Air We Breathe". Following a question period, there was a social period.

VERNON A. LAMB, *Secretary*

BOSTON BRANCH

Boston Branch met on April 6 in Hotel Statler, with PRESIDENT GAGNON in the chair and ANDREW W. GARRETT as Acting Secretary.

Two new members were elected. Convention Committee Members reported for their respective subdivisions. GEORGE P. SWIFT, LOUIS V. GAGNON and MANSON GLOVER were elected Convention Delegates, with STAN KNIGHT, RALPH STALBAUM and A. W. GARRETT as alternates. They were instructed to support Philadelphia Branch in its bid for the 1953 Convention. H. NARCUS, STAN KNIGHT and JOE SULLIVAN were appointed a transportation committee for the Regional Meeting in Hartford on May 6. The chair appointed STAN KNIGHT, JOE SULLIVAN and FELIX WINSOR a Nominating Committee for the 1950–1951 slate to be elected on June 22.

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The Librarian then introduced Mr. Ralph Stalbaum of the Duriron Company, Dayton, Ohio, who discussed "Handling and Heating of Plating Liquids". In his talk, illustrated with slides and sketches, Mr. Stalbaum described pumps from B. C. days to the present and explained which metals can be used with Duriron in handling of acid or alkaline solutions. Heat exchangers came in for their share of attention, and instructions were given for assembly and maintenance to obtain satisfactory service and quality performance. The meeting was followed by an informal discussion.

George P. Swift, *Secretary*

BRIDGEPORT BRANCH

The regular monthly meeting on March 3 had an attendance of thirty-four members and guests.

One applicant for membership was elected, and a new application was received. One member received transfer to the Boston Branch. Richard C. Barrett, Chairman of the Exhibit Committee, reported that plans are being formulated for the exhibit at the Boston Convention.

The members requested that a committee be formed at once to get a place for a Dinner-Dance to be held on May 27, without patronage. President Carl Schaefer named William A. Ehrencrona Chairman of the Banquet Committee.

Chick Helmle and Ben Kusterer, one of our Honorary members, were reported ill.

Four mothers of members, George Wagstaff, Frank Kalafus, James Belle, and Elton V. Buckley, had passed away. Our heartfelt sympathy goes to the families.

Refreshments were served through the courtesy of Mr. Ernest Reichenberg of the American Buff Corporation, Chicago, Ill.

Joseph G. Sterling,
Secretary-Treasurer

BRIDGEPORT BRANCH

An Open Meeting and Educational Session was held on March 17. Ray Goral, Librarian and Technical Chairman, opened the meeting with forty members and guests present and introduced Mr. Frank L. La Que of The International Nickel Company, who spoke on the subject of "Galvanic Corrosion as Related to Electrodeposited Coatings".

Slides shown by Mr. La Que showed the rate of corrosion of various metals. Galvanic effects were discussed, and it was pointed out that the corrosion of nickel deposits on steel was very intense as compared to that of nickel-chromium on steel.

The presentation proved most interesting and provoked considerable discussion.

Joseph G. Sterling,
Secretary-Treasurer

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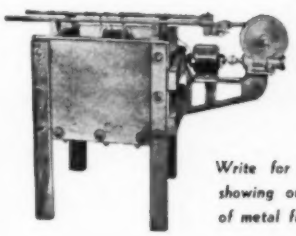

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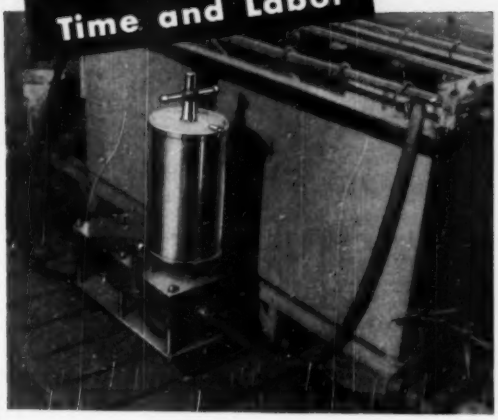

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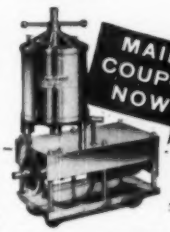

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- ☐ Burnishing
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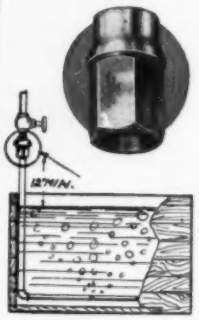

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Branch News

HAMILTON BRANCH

The regular monthly meeting was held on April 21 in the West Plant Auditorium of the Canadian Westinghouse. President E. K. Cranfield introduced the guest speaker, Mr. James Snedden of the Steel Company of Canada, who presented an extremely enlightening address on "Steels for Plating and Their Manufacture".

Mr. Snedden acknowledged how dependent the plated finish was upon the surface of the base metal. He explained how formerly the practice had been to roll several sheets together, so that only the two outside sheets were in contact with the rolls and took on a roll surface while the inside sheets were apt to be rough and unsuitable for plating. By cold rolling single sheets the surface smoothness of the sheet could be controlled by the finish on the rolls. Cold reduction, he explained, produced a sheet of steel free from scale and of a controlled final thickness. It is extremely important that annealing follow this operation to return the steel to a ductile state.

J. C. Harden, *Correspondent*

HARTFORD BRANCH

A Bureau of Mines movie, "Zinc, Its Mining and Smelting", was shown at the start of the meeting on April 17, attended by about fifty members and guests.

The guest speaker was Mr. A. H. Du Rose of The Harshaw Chemical Company, whose subject was "Impurities and Purification of Electroplating Solutions". He showed the amounts of impurities—copper, iron, chromium, zinc, aluminum, calcium, magnesium, silicon, etc.—found in typical nickel baths by means of spectrographic analyses. Some of the methods for the removal of these impurities were electrolysis, raising the *p*H and filtering, and using activated carbon. The latter was discussed in detail, and it was brought out that commercial carbons vary in their ability to remove impurities, one type of carbon showing more preference for a certain impurity than another.

Kermit T. Simons acted as technical chairman, and refreshments were served through the courtesy of The Harshaw Chemical Company.

This was also election night, and the following were elected to serve during the coming year:

President—Al Dankevich
First Vice-President—Andrew Palm
Second Vice-President—Kenneth Kelly
Treasurer—Joseph McInerney
Secretary—Stanley Platoz
Educational Advisor—Ralph McCahan
Librarian—Kermit T. Simons
Educational Committee—Joe Backus, Savin Zavarella, Julia Majkowski, Gene Dowling
Board of Managers—C. Edward Anderson, Frank Smith, Clarence Rosenbeck
Sergeant-at-Arms—George Colombie
Convention Delegates—Art Logozzo, George Hogaboom, Al Dankevich
Alternates—Ralph McCahan, William Cullen, Frank Smith
Stanley Platoz, *Secretary*

JACKSON-LANSING BRANCH

Officers for the 1950–1951 season were

PLATO — SOMEBODY SHOULD TELL YOU, BUB — THEY NEVER WORK HERE DURING CONVENTIONS — IT'S LIKE A HOLIDAY — 'TWAS THE NIGHT BEFORE THE CONVENTION 'N' ALL THRU THE HOUSE NOT A PLATER WAS STEERIN' NOT EVEN A BOSS!
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Zinc on Steel: A164

Coating	Type G.S.	Type I.S.	Type R.S.
Zinc, inch	0.001	0.0005	0.00015

Cadmium on Steel: A165

Coating	Type N.S.	Type O.S.	Type T.S.
Cadmium, inch	0.0005	0.0003	0.00015

Nickel-Chromium on Steels: A166

Coating	Type D.S.	Type F.S.	Type K.S.	Type Q.S.
Copper plus nickel, inch	0.0020[a]	0.00125	0.00075	0.0004
Final nickel, inch	0.0010	0.0006	0.0004	0.0002
Chromium (if required), inch	0.00001	0.00001	0.00001	0.00001
Resistance to standard salt spray, hours without appreciable corrosion	96	72	48	16

[a]When copper is used in excess of a thickness of 0.0001 inch, its minimum thickness shall be 0.00075 inch.

Nickel-Chromium on Copper and Copper-Base Alloys: B141

Coating	Type F C	Type K.C.	Type Q.C.
Nickel, inch	0.0005	0.0003	0.0001
Chromium (if required), inch	0.00001[a]	0.00001	0.00001

[a]Maximum thickness should be kept below 0.00003 inch to prevent cracking.

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Nickel-Chromium on Zinc and Zinc-Base Alloys: B141

Coating	Type P.Z.	Type K.Z.	Type Q.Z.
Copper plus nickel, inch	0.00125	0.00075	0.0005[a]
Copper, inch	0.0004	0.0003	0.0002
Final nickel, inch	0.0005	0.0003	0.0003
Chromium (if required), inch	0.00001	0.00001	0.00001
Resistance to standard salt spray, hours without appreciable corrosion	48	32	16

[a]Total of 0.0003 inch if alternative of nickel only is used.

Lead Coatings on Steel: B200

Type	Copper inch	Lead inch	Salt spray Resistance[a] hours
E.S.	.....	0.0010	96
ER.S.	0.000015	0.0010	96
M.S.	.....	0.0005	48
MM.S.	0.000015	0.0005	48
P.S.	.....	0.00025	24
PP.S.	0.000015	0.00025	24

[a]To standard salt spray test in hours without appreciable corrosion.

Chromate Finishes on Zinc: B201

With two crossing, 1-inch long scratches through the chromate coating only, the part shall show no white corrosion visible to the unaided eye at normal reading distance after 24 hours in a standard salt spray test.

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Branch News

elected at the meeting on April 11 in Hotel Porter, Lansing, as follows:

President—U. J. Forsyth
First Vice-President—W. H. Mogle
Second Vice-President—R. W. Redmond
Third Vice-President—R. T. Rollis
Secretary-Treasurer—E. F. Streifling
Librarian—L. M. Henderson
Assistant Librarian—E. J. Bosca
Publicity Chairman—F. W. Stuckenberg
Directors—Dr. D. T. Ewing, E. L. Deming, Mills Drake, R. A. Stewart, W. J. McKeon

Mr. C. F. Nixon, A. E. S. Second Vice-President, spoke about the work of the parent organization and explained the use to which dues money is put. His discussion, with illustrated slides, was very interesting to the membership.

The Bias Buff and Wheel Company furnished the dinner and entertainment.

Fred W. Stuckenberg,
Publicity Chairman

LOS ANGELES BRANCH

Four new members were welcomed at the regular dinner meeting on April 12 in Rodger Young Auditorium.

R. J. Wooley reported a special meeting of the 1951 Convention Committee with Mr. Logozzo on March 18, when it was decided to change the date of the Convention to the week starting June 25. Jack Beall reported a gain of two sustaining members since the March meeting.

Librarian McDonald introduced Mr. Keith Holtzclaw of the International Electronics and Transformer Company, who delivered a stimulating talk on "Rectifiers", which was well received by every one present. An unusually long discussion period followed.

The latter portion of the evening was taken up with the installation of officers for the coming year, at which Earl Coffin officiated. The outgoing President, Alan Sulzinger, was presented with a handsome wallet.

M. H. Orbaugh, *Secretary*

MELBOURNE BRANCH

Over seventy members and visitors attended the fifty-first regular meeting of the Branch, held at the Melbourne Technical College on April 12. This excellent attendance was due to the presence, as guest speaker, of Sir Ernest Canning, Chairman and Joint Managing Director of W. Canning and Company, Birmingham, England. Brief announcements from Committeemen Gow, Noy, Leigh and Walker preceded suspension of general business to allow the speaker more time.

Second Vice-President Taylor introduced Sir Ernest, who proceeded to relate a number of interesting and, at times, amusing anecdotes of his experiences in electroplating. These began in 1887 when, at the age of eleven, he spent a day and part of a night assisting his brother to start a tempermental generator. Other tales concerned the various improvisations, wise and unwise, applied by intrepid platers in different parts of the world. Sir Ernest found time to comment favourably on certain aspects of the Australian plating scene, particularly on the educational side, and made some helpful suggestions on other matters.

The normal discussion period ensued, and the speaker gave interesting answers to a number of questions. Finally, a vote of thanks was passed most heartily on the motion of Secretary Dale, who remarked on the good fortune of the Branch in obtaining such a famous speaker.

John J. Dale, *Hon. Secretary*

MONTREAL BRANCH

Forty-three members and guests were present at the regular monthly meeting on April 4 to hear Mr. H. J. McAleer, Formax Corporation, Detroit, Mich., give a very interesting talk on "The Inside Story of Buffing Wheels and Compounds". Mr. McAleer discussed in detail the various types, sources, and uses of the materials used today. This included a description of the silicas and how they are used to achieve fast or slow cutting; the lime compounds and rouges and their applications—lime for nickel, rouge for silver; and the manufactured abrasives—how aluminum oxide is prepared and compounded with different binders for use on wheels. The melting point of greases was stressed as having an important bearing on the clogging of wheels and belts. The make-up of three commonly used buffs was then explained, to-

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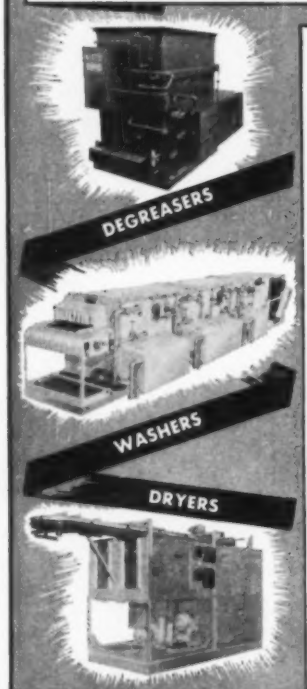

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gether with cotton counts and weights and the methods used to assure the maximum efficiency of each type. Mr. McAleer spoke for eighty minutes, and in the opinion of the Branch, never before did it have this subject discussed in such a competent manner.

Delegates to the Convention were appointed.

The President noted the absence of J. H. FEELEY, whose wife had been admitted to the hospital that evening. The Branch expressed sincere wishes for her speedy return to health.

WILLIAM GLOVER, *Secretary*

NEWARK BRANCH

DR. ROY HEATH of the J. B. Ford Division of Wyandotte Chemicals Corporation was the featured speaker on March 3. Speaking on the subject, "Alkalies in Cleaning", he began with a historical review and a description of how such chemicals as sodium bicarbonate, soda ash, sodium phosphates, sodium silicate, and caustic soda are made from the salt from wells in the Michigan region. A goodly number of photographs were thrown on the screen, which helped the audience to visualize the tremendous amount of equipment needed in their manufacture. He then told how these chemicals and others were employed in compounding cleaners and emphasized that cleaners could be better adapted to the work if platers knew more about the composition and structure of the base metals.

DR. HENRY B. LINFORD, Project Director of A. E. S. Research Project No. 12, stated that the chief objects of this project were to establish standards of cleanliness for metallic surfaces and find means to distinguish between films that may be detrimental and those which are non-objectionable in a subsequent plating operation.

PRESIDENT BOWERMAN appointed the members of the Board of Managers to the Nominating Committee for the election of officers, with H. H. SMITH as chairman. One member was reinstated and given a transfer to the Allentown-Reading Branch.

SAMUEL S. FREY,
Recording Secretary

PHILADELPHIA BRANCH

The meeting on March 24 was called to order by FIRST VICE-PRESIDENT GEORGE GIBBS in the absence of PRESIDENT HEIMAN, whose mother had passed away that day. Fifty members and guests were present.

In the absence of the Librarian, the Secretary introduced MR. HENRY STROW, Chief Chemist of MacDermid, Inc., Waterbury, Conn., who spoke about "Trouble Shooting Experiences in Copper, Nickel and Chromium Plating". Mr. Strow stressed the importance of preplating operations, including racking, to obtain good work. He observed that an adequate cleaning cycle does not require the use

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Branch News

of a copper strike, except for diecastings prior to high-speed copper. The cyanide copper strike bath should contain from 2 to 2.5 oz/gal copper, higher metal content producing greater tendency for immersion deposition; for consistent results the free cyanide should be titrated at a standard temperature; at *p*H below 12 the bath tends to produce red deposits, but ½ oz/gal caustic soda will give the proper *p*H. A practical method of reducing carbonate content is treating a portion of the solution in a steel drum with lime, allowing the calcium carbonate to settle overnight, and transfering back to the plating tank the clear portion of the treated solution. Sodium sulfide may be used to remove heavy metals from copper cyanide solutions, but should not be used when the free cyanide is higher than 1 oz/gal.

MR. THOMAS LYONS, a member of the Branch, then gave a brief talk about his hard-chromium plating experiences at the Philadelphia Naval Aircraft Factory.

The following were elected to serve during the 1950–1951 fiscal year:

President—DR. SAMUEL HEIMAN
First Vice-President—GEORGE A. GIBBS
Second Vice-President—ALFRED H. POPE
Secretary—I. WM. MARCOVITCH
Treasurer—GEORGE M. LONG
Librarian—ALBERT HIRSCH
Board of Managers—ROBERT L. FARREN, JR., PAUL MENTZER, SR., NAT VERRELLE, WILLIAM H. TRUSDELL

Delegates are DR. SAMUEL HEIMAN, I. WM. MARCOVITCH, THOMAS M. RODGERS, alternates, GEORGE M. LONG, GEORGE A GIBBS, HENRY A. OALIK.

PAST PRESIDENT EUGENE ZURBACK, JR., inducted the newly elected officers.

Three applications for active membership were received. The door prize, an electric kitchen clock donated by The Harshaw Chemical Company, was won by GENE ZURBACH.

I. WM. MARCOVITCH, *Secretary*

SAGINAW VALLEY BRANCH

The regular monthly meeting was held on March 8 at Zehnder's Hotel in Frankenmuth with an attendance of forty-four members and guests.

MESSRS. B. SHOTTEN and B. F. LEWIS of Northwest Chemical Company, Detroit, spoke first, about cleaning prior to plating and the necessity of coordinating buffing room with plating room. The second speaker was MR. B. C. CASE of Hanson-Van Winkle-Munning Company, Detroit. His topic, "Foreseeable Factors of Nickel Plating", dealt with some new developments. MR. G. CARLSON of Acme Manufacturing Company, Detroit, the third speaker of the evening, showed films of automatic buffing installations. A question and answer period followed.

The officers for the coming fiscal year were announced as follows:

President—JOSEPH FARMER
First Vice-President—W. E. REMINGTON
Second Vice-President—L. J. MINBIOLE, JR.
Secretary-Treasurer—ALFRED MUEHLENBECK
Recording Secretary—W. W. KAUFMANN
Librarian—R. J. BRINK
Board of Managers—DANIEL P. WAITS, MELVIN TIPPMAN, MANUEL BEN, ROBERT A. NYQUIST, JOHN JACKS, John W. LEE

JOHN W. LEE, *Recording Secretary*

ST. JOSEPH VALLEY BRANCH

Thirty-two members and guests enjoyed the dinner, and forty-three were present for the technical session on March 1.

Four applications for membership were received, and one applicant was elected to membership.

A joint meeting of the A. S. M. being scheduled for April, the election was held at this meeting with the following result:

President—DR. HAROLD J. WIESNER
First Vice-President—VICTOR E. PETERSON
Second Vice-President—RICHARD C. LOCKERBIE
Librarian—DR. ERNEST J. WILHELM
Secretary-Treasurer—EUGENE ROTH
Board of Managers—JOHN C. BAYMAN (1 year), WILLIAM S. MCDOWELL (2 years), ELMER O. BRADY (3 years)

Dr. Wiesner announced three Sustaining Members in the St. Joseph Valley: Standard Plating Works, Goshen, Ind., Bendix Products Division, South Bend, Ind., Studebaker Corporation, South Bend, Ind.

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Dr. Wilhelm then introduced the speaker for the technical session, Mr. Ramsey Bell, and his colleague at Hammond Machinery Builders, Inc., Mr. Robert Shaw. The topic of their illustrated presentation was "Polishing and Buffing Machines". A complete line of polishing and buffing machines and the capabilities of these machines was discussed together with the various job applications. A new type of finish comparator consisting of two 30-diameter magnification projectors was shown.

A lengthy discussion of problems relating to finishing followed, in which the application of belts, buffs, polishing set-up wheels, solid and liquid compounds were brought up.

Eugene Roth, *Secretary-Treasurer*

SOUTHEASTERN BRANCH

The regular monthly meeting was held on March 17 in the Green Turtle Restaurant, Jacksonville, Fla., with an attendance of twenty-three. Five members traveled from Atlanta, Ga., one from Ringgold, Ga., two from Spartansburg, S. C., and one from Birmingham, Ala. We were also favored by a visit from Ralph Ambruster of MacDermid, Inc., from up East.

After a wonderful meal, a Nominating Committee was appointed, consisting of George Taylor, Francis Webster, and Clem Hohner.

Dave Griffin of Birmingham introduced the speaker, Mr. Raymond M. Shock of the Detroit Branch and Executive Secretary of the National Association of Metal Finishers. Mr. Shock told of the efforts of a joint committee of the A. E. S. and the N. A. M. F. in attempting to get recognition of the plating industry in the eyes of the public. This committee is doing everything in its power to get the Federal Government interested in the job that the plating industry is doing. Mr. Shock made a request that this Branch furnish him with the names of each plant in its territory that does plating. Everyone enjoyed Mr. Shock's talk and found it highly educational.

Prior to and after the meeting, visits were made to the Naval Air Station, Florida Plating & Finishing Company, and Crown Plating Works. Our thanks go to George Taylor and the other Jacksonville members for their hospitality and their efforts in making the meeting such a success.

Two applicants were elected to membership.

William T. Weymouth,
Secretary-Treasurer

SYDNEY BRANCH

Forty members and visitors were present at the sixty-first regular meeting on March 9 to hear Sir Ernest Canning give a very interesting talk about his experiences in the plating industry. The discussion which followed proved the popularity of Sir Ernest, who is undoubtedly one of the foremost men in the plating industry of the world.

H. Coates, *Secretary-Treasurer*

WATERBURY BRANCH

At the March meeting President George Hisert appointed C. A. Kilborn, Chairman; W. D. Starr, and A. J. Maz to serve as a Nominating Committee. Their slate of officers will be discussed at the April meeting, in preparation for the election in May.

Dr. Durbernell's review covered the A. S. T. M. bibliography on metal cleaning. This pamphlet contains five hundred references with extensive abstracts on each reference.

We were happy to have Mr. George Hogaboom as our guest speaker, talking about the "Preparation of the Surface of the Basis Metal for Electroplating". Slides showing cast iron, hard cold-rolled steel, fully annealed low-carbon steel, their structure, dirt inclusions, etc., illustrated his contention that it is of utmost importance that the plater know the history of the metal he has to finish. The production of the metal and the operations which it undergoes before it is ready to be plated influences the electrodeposit to a marked degree. With this knowledge the plater need not guess at the proper preparatory cycle but can plan his cleaning procedure to give the best possible plated surface.

The Ladies' Night program will be held on June 1 in Hotel Elton. This year we are having as speakers Professor Harry R. Rudin of the Department of History, Yale University, who will talk on the latest developments in world affairs. He is very interesting, and his material will be up-to-the-minute and authoritative.

S. L. Henn, *Secretary*

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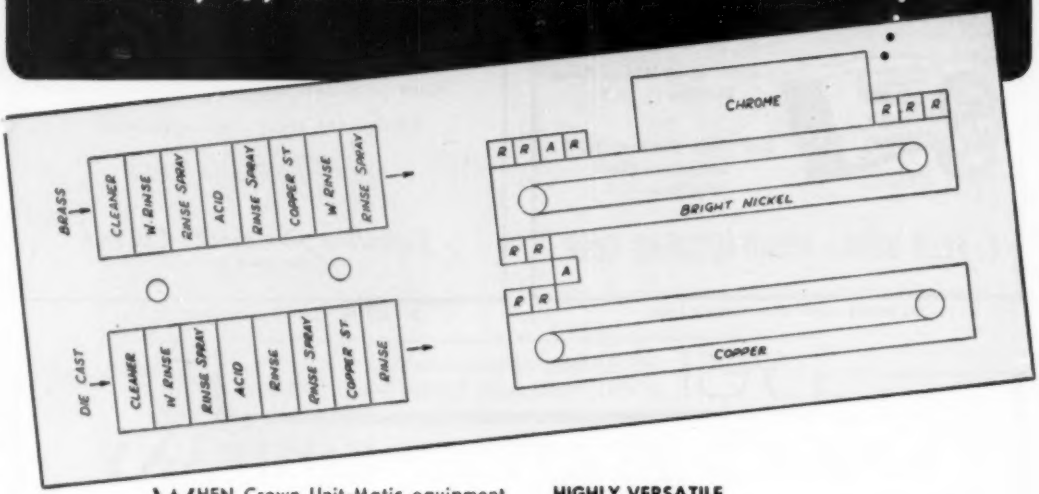

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Secretary.....The Executive Secretary

LOCAL BRANCHES

ADELAIDE, AUSTRALIA meets second Wednesday of each month. Address G.P.O. Box 598E, Adelaide, S. A., Australia.

ALLENTOWN-READING meets third Wednesday of each month in Spurgeon's Hotel, Allentown, Pa. Secretary-Treasurer, James F. Riegel, 425 S. 18th Street, Allentown, Pa. Research Finance Committee Chairman, G. W. Ward, 212 N. 6th Street, Allentown, Pa.

BALTIMORE-WASHINGTON meets second Tuesday of October, December, February, and April in Baltimore at the Engineers' Club, and of November, January, March, and May in Washington, D. C., at the Garden House, Dodge Hotel. Secretary, George E. Best, c/o Research Department, Mutual Chemical Company of America, 1348 Block Street, Baltimore 31, Md.

BOSTON meets first Thursday of each month in Hotel Statler. Secretary, Dr. George P. Swift, 53 Galen Street, Watertown, 72, Mass. Research Finance Committee Chairman, Eugene P. Carter, c/o United Carr Fastener Corporation, 81 Ames Street, Cambridge, Mass.

BRIDGEPORT meets first and third Friday of each month in Barnum Hotel. Secretary-Treasurer, Joseph G. Sterling, 134 Colony Street, Bridgeport 8, Conn. Research Finance Committee Chairman, Carl Schaefer, c/o Casco Products Corporation, 512 Hancock Avenue, Bridgeport 5, Conn.

BUFFALO meets first Friday of each month in Markeen Hotel. Secretary, T. Joseph Cuerdon, Jr., 263 Stevenson Boulevard, Buffalo 21, N. Y. Research Finance Committee Chairman, B. P. Fortrim, 200 Forest Drive, Orchard Park, N. Y.

CHICAGO meets second Friday of each month at 8 P. M. at Western Society of Engineers, 84 E. Randolph Street. Secretary-Treasurer, Paul Glab, 882 N. Paulina Street, Chicago, Ill. Research Finance Committee Chairman, Clyde Kelly, 740 W. Englewood, Chicago 21, Ill.

CINCINNATI meets fourth Wednesday of each month at 8 P. M. in Engineering Society Headquarters, McMillan Street and Woodburn Avenue. Secretary-Treasurer, Charles Wise, 3973 Ardmore Avenue, Cincinnati 16, Ohio.

CLEVELAND meets first Friday of each month in Cleveland Hotel at 8 P. M. Secretary-Treasurer, Harry Pochapsky, 24961 Euclid Avenue, Cleveland, Ohio. Research Finance Committee Chairman, E. C. Friedl, c/o du Pont Company, 1335 Guardian Building, Cleveland 14, Ohio.

COLUMBUS meets first Friday of each month at 8 P. M. in Battelle Memorial Institute Auditorium. Secretary-Treasurer, Nathan L. Koslin, 2641 Cleveland Avenue, Columbus 11, Ohio.

DAYTON meets first Friday of each month in Engineers Club. Secretary, Richard M. Clinehens, 701 W. Stewart Street, Dayton 8, Ohio. Research Finance Committee Chairman, C. W. Powell, 3112 Princeton Drive, Dayton 6, Ohio.

DETROIT meets first Friday of each month in Hotel Statler. Secretary-Treasurer, Joseph Gurski, 8885 Littlefield, Detroit 28, Mich. Research Finance Committee Chairman, W. B. Knight, c/o Knight Plating Company, 3143 Bellevue Avenue, Detroit 11, Mich.

GRAND RAPIDS meets second Friday of each month at 7:30 P. M. in Rowe Hotel. Secretary, Victor V. Ventoli, 225 Fountain Street, N. E., Grand Rapids, Mich. Research Finance Committee Chairman, John W. Putte, 308 Gladstone Avenue, S. E., Grand Rapids, Mich.

HAMILTON BRANCH. Secretary, William G. Finlay, c/o The M. & Y. Products Limited, Hamilton, Ontario, Canada.

HARTFORD meets third Monday of each month in Hotel Bond. Secretary, Stanley Platoz, 26 Erwin Place, New Britain, Conn. Research Finance Committee Chairman, Frank W. Smith, 46 Cottage Street, Meriden, Conn.

INDIANAPOLIS meets first Wednesday of each month at Fox Steak House, 1207 Washington Street. Secretary, Howard Phillips, 1024 Shelby Street, Indianapolis 3, Ind.

JACKSON-LANSING meets second Tuesday of each month alternating between Hayes Hotel in Jackson and Porter Hotel in Lansing. Secretary-Treasurer, E. F. Strefling, 1423 Kelsey Avenue, Lansing 10, Mich.

LANCASTER meets second Friday of each month at 8 P. M. In Thaddeus Stevens Industrial School. Secretary-Treasurer, Harry A. Saylor, 40 N. Poplar Street, Elizabethtown, Pa. Research Finance Committee Chairman, Harry Hovis, Lincoln Highway, West Lancaster, Pa.

LOS ANGELES meets second Wednesday of each month at 6:30 P. M. in Rodger Young Auditorium Secretary, G. D. McDonald, Jr., 3114 Purdue Avenue, Los Angeles 34, Calif.

LOUISVILLE meets third Thursday of each month in Room 119, Speed Scientific Building, University of Louisville. Secretary-Treasurer, G. H. Hillebrand, Jr., 1821 Frankfort Avenue, Louisville, Ky. Research Finance Committee Chairman, Garland Logsdon, 1519 Central Avenue, Louisville, Ky.

MELBOURNE, AUSTRALIA meets third Thursday of each month at 8 P. M. in Metallurgy Theatre, Melbourne Technical College, 124 Latrobe Street. Hon. Secretary-Treasurer, John J. Dale, c/o Defense Research Laboratories, Maribyrnong, Victoria, Australia.

MILWAUKEE meets first Friday of each month in Red Arrow Club, 774 N. Broadway. Secretary-Treasurer, Harry J. Krueger, Route 7, Box 224, Wauwatosa 13, Wis. Research Finance Committee Chairman, James Paulson.

MONTREAL meets first Tuesday of each month in Mount Royal Hotel. Secretary-Treasurer, W. L. Glover, 754 Second Avenue, Verdun, P. Q., Canada. Research Finance Committee Chairman, P. M. Coady, c/o Alloycraft, Ltd., 27 Hillside Avenue, Westmount, Montreal 6, P. Q., Canada.

NEWARK meets first and third Fridays of each month at 8 P. M. in Hotel Robert Treet. Secretary-Treasurer, George Wagner, 1130 S. Long Avenue, Hillside, N. J. Research Finance Committee Chairman, Edwin Bowerman, 166-41 17th Avenue, Whitestone, N. Y.

NEW HAVEN meets second Tuesday of each month alternating between Sterling Chemistry Laboratory, Yale University, and Hotel Taft. Secretary-Treasurer, B. J. Gaffney, 40 Filbert Street, Spring Glen, Hamden 14, Conn. Research Finance Committee Chairman, Dr. H. L. Kellner, c/o Lea Manufacturing Company, 16 Cherry Avenue, Waterbury 86, Conn.

NEW YORK meets second and fourth Fridays of each month in Statler Hotel. Secretary-Treasurer, George Schore, 150 Bennett Avenue, New York 33, N. Y. Research Finance Committee Chairman, George F. Hermann, 52 Chestnut Street, Brooklyn 8, N. Y.

PHILADELPHIA meets fourth Friday of each month in Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Streets. Secretary, I. William Marcovitch, 1434 Lardner Street, Philadelphia 24, Pa. Research Finance Committee Chairman, Al Hirsch, 1945 W. Airdrie Street, Philadelphia 40, Pa.

PITTSBURGH meets second Thursday of each month in the Avon Room of Sheraton Hotel. Secretary, John M. Davidson, Iola Street, R. F. D., Glenshaw, Pa. Research Finance Committee Chairman, R. A. Woofter, 42 Hiland Avenue, Emsworth, Pittsburgh 2, Pa.

PROVIDENCE-ATTLEBORO meets third Monday of each month in Providence-Biltmore Hotel. Secretary, Frank W. Boothroyd, 51 Barber Ave., Apponaug, R. I. Research Finance Committee Chairman, Pierre B. Lousbury, 78 North Ave., Attleboro, Mass.

ROCHESTER meets third Monday of each month in Ukranian-American Club. Secretary, Gordon W. MacDonald, North Bergen Road, R. D. No. 1, Bergen, N. Y. Research Finance Committee Chairman, Cecil Thornton, 20 Lafayette Parkway, Rochester, N. Y.

ROCKFORD meets second Monday of each month in Faust Hotel. Secretary, Vern T. Wissen, Spring Creek Road, Rockford, Ill. Research Finance Committee Chairman, Al Overbie, c/o National Lock Company, Rockford, Ill.

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ST. JOSEPH VALLEY meets first Wednesday of each month at 8 P. M. in Hotel Elkhart, Elkhart, Ind. Secretary-Treasurer, Eugene Roth, 1720 Mishawaka Avenue, South Bend 15, Ind. Research Finance Committee Chairman, Ray Friend, 1435 Howard Street, Niles, Mich.

ST. LOUIS meets second Wednesday of each month in York Hotel. Secretary-Treasurer, E. R. Hunleth, 4415 Michigan Avenue, St. Louis, Mo. Research Finance Committee Chairman, H. Siegel, c/o Siegel-Roberts Plating Company, 4193 Manchester Avenue, St. Louis, Mo.

SAN FRANCISCO meets second Thursday of each month, alternating between El Jardin Restaurant, 22 California Street, San Francisco, and El Curtola Restaurant, 510 17th Street, Oakland. Secretary-Treasurer, Roy Fellom, Jr., 709 Mission Street, San Francisco, Calif.

SOUTHEASTERN meets second Friday of each month in Robert Fulton Hotel, Atlanta, Ga. Secretary, William Weymouth, 173 Clay Street, S. E., Atlanta, Ga. Research Finance Committee Chairman, Dr. Fred W. Cox, Engineering Experiment Station, Georgia School of Technology, Atlanta, Ga.

SPRINGFIELD meets fourth Monday of each month in Hotel Charles. Secretary, P. W. Prouty, 69 S. Park Avenue, Longmeadow 6, Mass. Research Finance Committee Chairman, James Laing, c/o Van Valkenburg Company, Montgomery Street, Williamansett, Mass.

SYDNEY, AUSTRALIA. Secretary-Treasurer, H. Coates, Box 1339, G. P. O., Sydney, N. S. W., Australia.

SYRACUSE meets third Monday of each month in Hotel Syracuse. Secretary, Lindley Wood, 1329 Bellevue Avenue, Syracuse 4, N. Y. Research Finance Committee Chairman, George W. Cavanaugh, 129 Kenwood Avenue, Syracuse, N. Y.

TOLEDO meets first Thursday of each month at Commodore Perry Hotel. Secretary, Gaston Bergeman, 703 Pine Street, Fremont, Ohio. Research Finance Committee Chairman, William Russell, 7th Street at Dixie Highway, Perrysburg, Ohio.

TORONTO meets second Friday of each month in Royal York Hotel. Secretary, R. Stevens, c/o Bryden Brass Company, 927 Dufferin Street, Toronto, Canada. Research Finance Committee Chairman, C. D. Short, 1281 Pape Avenue, Toronto, Canada.

TWIN CITY meets first Monday of each month, October through June, in Covered Wagon Cafe, Lodge Room, 114 S. 4th Street, Minneapolis. Secretary-Treasurer, Robert L. Buckley, 316 Builders Exchange, Minneapolis 2, Minn. Research Finance Committee Chairman, Gunnar Deedon, 3650 47th Avenue S., Minneapolis, Minn.

WATERBURY meets second Friday of each month in Elton Hotel. Secretary-Treasurer, Spencer L. Henn, P. O. Box. Dr. B, Cheshire, Conn. Research Finance Committee Chairman, Anthony Maz, c/o Risdon Manufacturing Company, Waterbury, Conn.

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AMERICAN SOCIETY FOR TESTING MATERIALS 53rd Annual Meeting and 9th Exhibit of Testing Apparatus and Related Equipment in Chalfonte-Haddon Hall, Atlantic City, N. J., on June 26–30.

SAGINAW VALLEY BRANCH, A. E. S. Annual Stag Day at Brookwood Golf Club, Flint, Mich., on July 15.

DETROIT BRANCH, A. E. S. Annual Stag Day at Forest Lake Country Club near Pontiac, Mich., on July 29.

INDUSTRIAL FINISHES EXHIBITION at Earle Court, Kensington, London, England on August 30–September 7.

FIRST U. S. INTERNATIONAL TRADE FAIR in International Amphitheatre, Coliseum, Navy Pier, and Chicago Arena, Chicago, Ill., on August 7–20.

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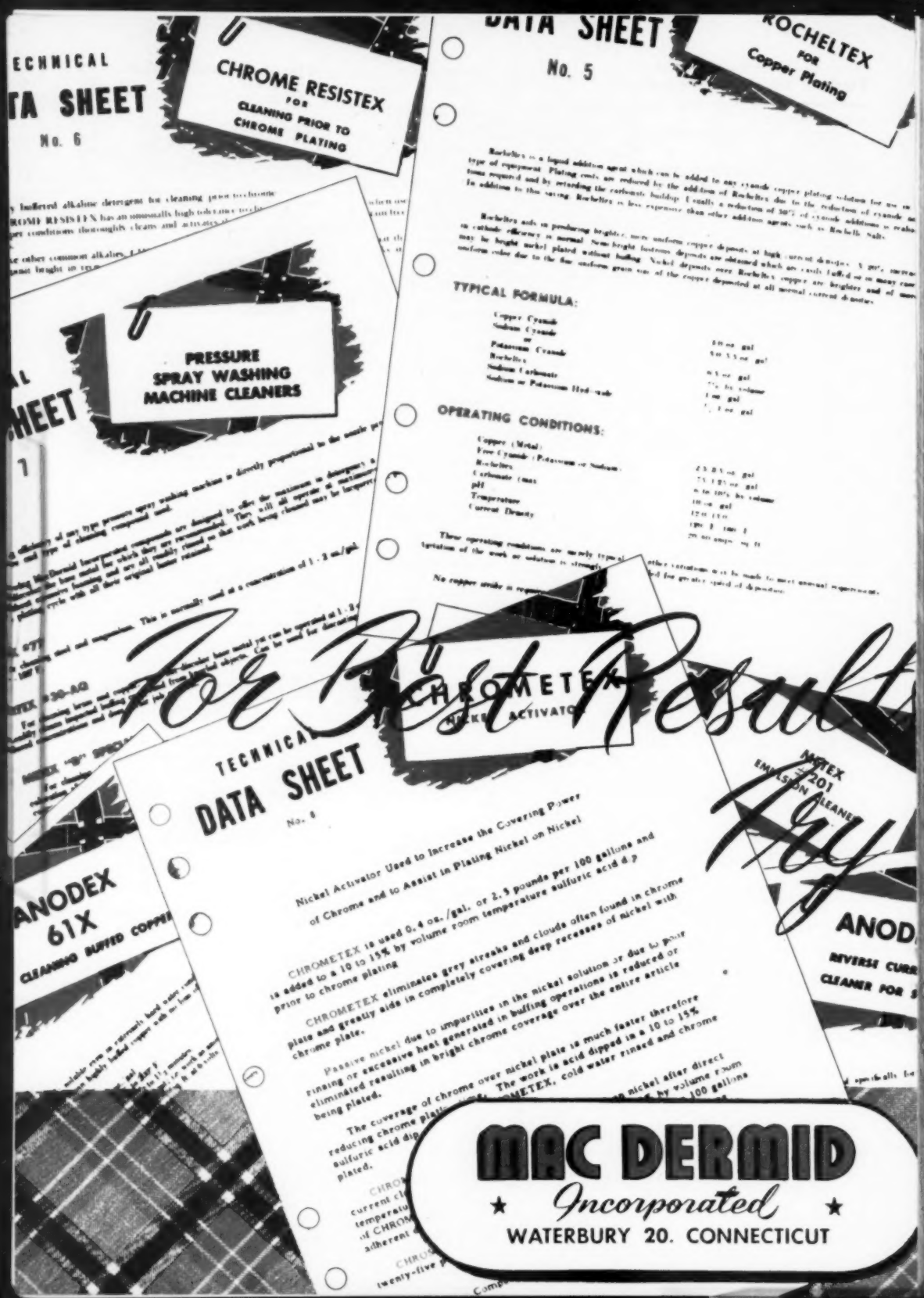
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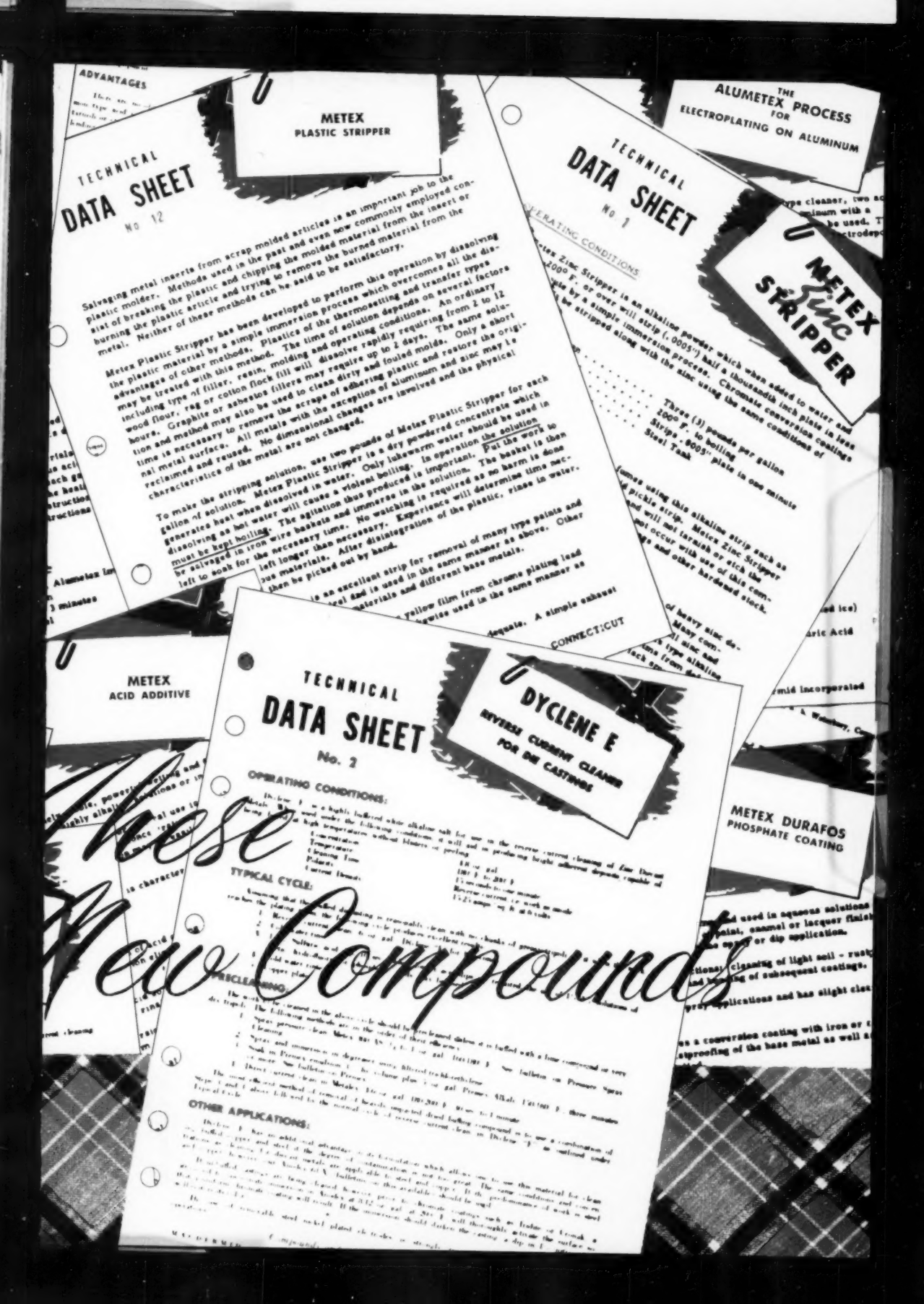
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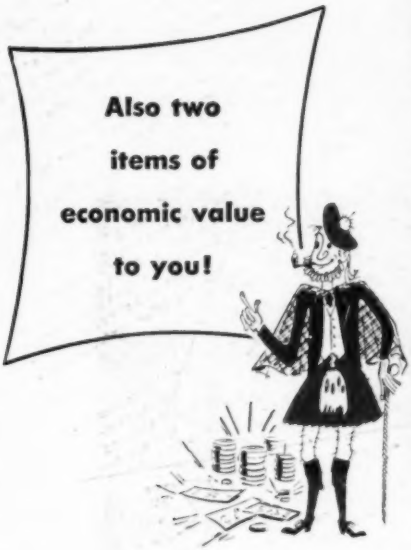
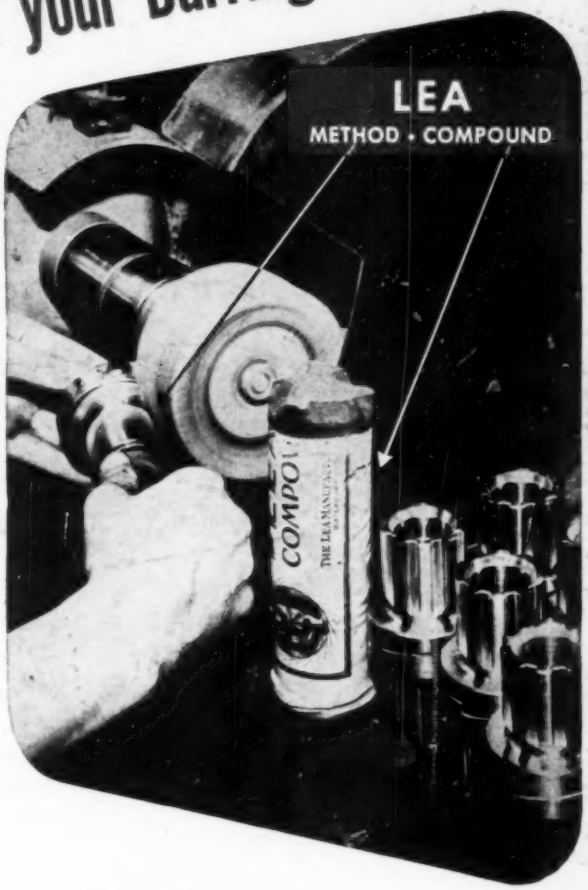
Two Reliables for your Burring Problems!





Burring is more than just removing slivers and splinters. It's a "finishing" operation whereby sharp edges are rounded off... contours are shaped... openings and insert recesses are made more precise.

Specification requirements during World War II showed what could be done with Lea Finishing Methods and with the proper grades of Lea Compositions in the way of solving burring problems. Today, many plants with similar problems have continued with original or modified Lea Methods. Many companies that had no burring problems during the war came up with some in their postwar production. These companies, too, came to Lea for the answer...for both technique and compositions.

We suggest that you do the same... if you have a burring problem. As a matter of fact, why not bring *any* finishing problem to the attention of our technical department?

THE LEA MANUFACTURING CO.
16 Cherry Avenue, Waterbury 20, Conn.

Burring, Buffing and Polishing... Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions.

LEA MFG. COMPANY OF CANADA, LTD.
370 Victoria Street
Toronto 2, Canada

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